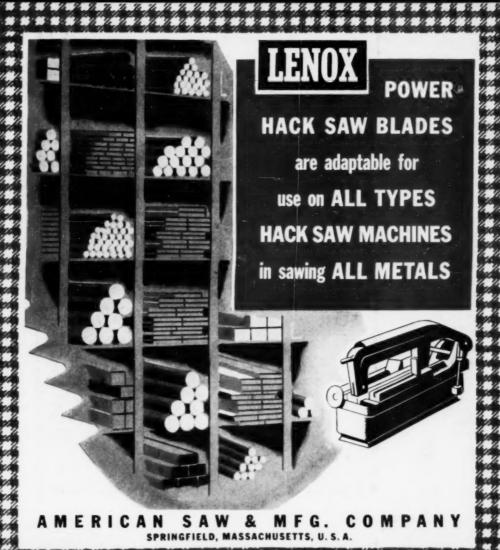
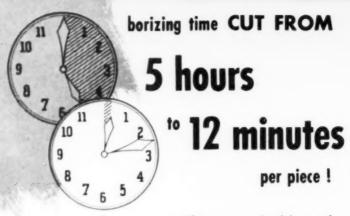
### Modern Machine Shop





...with a new, double-end Heald Bore-Matic

The amount of time that you can save with a new Heald machine is a measure of the time now being lost through out-dated equipment and methods. How much is this "lost time" — and what is it costing you in terms of production efficiency? Your nearest Heald representative will be glad to study your finishing aperations and give you the answer — without obligation. Remember — when it comes to precision finishing, it pays to come to Heald.

By performing many different open otions in one high speed, wind matic cycle, the Heald Model 322 Bare-Matic shown below includity sweed 4 hours and 48 minutes on each part.

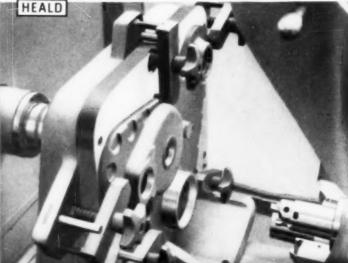
On this markine, year case covers for diesel engines are bared faced chambered and turned with but a single set up. As this job formerly required separate operations on different markines, the saving in set up and handling time was tremendays.

A total of four boringheads are used wome on the left hand bridge and three on the right. The work clamped to an angle plate fixture is automatically presented to the two sets of heads in sequence ofter which disclaims to center for reloading.

THE HEALD MACHINE COMPANY



part Office Charge • December • Design • Delign



Heald Model 322 Base Mone, whom any multiple tooling and champing fishere for horizing year case where in a single set up. VOLUME 23 NUMBER 9 PEBRUARY, 1951

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FRED W. VOGEL Managing Editor

ROBERT I. SHORE New Equipment Editor

C. W. HINMAN GILBERT C. CLOSE Contributing Editors

GENE J. SCHWARBER Advertising Manager

NORMAN S. ROGERS Art Director

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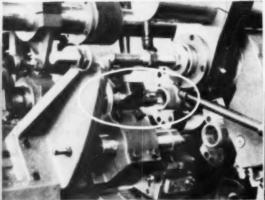
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# Many Thread Diameters



This ability to cut thread diameters of varying sizes is an outstanding feature of all LANDIS Taps.

The thread-cutting head is detachable, thus allowing tap heads of various sizes and capacities to be used interchangeably on the same tap body. For example, the SALT Tap will cut threads from 1% to 6% in diameter. In addition, left-hand threads may be cut with the same tap bodies by using detachable left-hand tap heads.

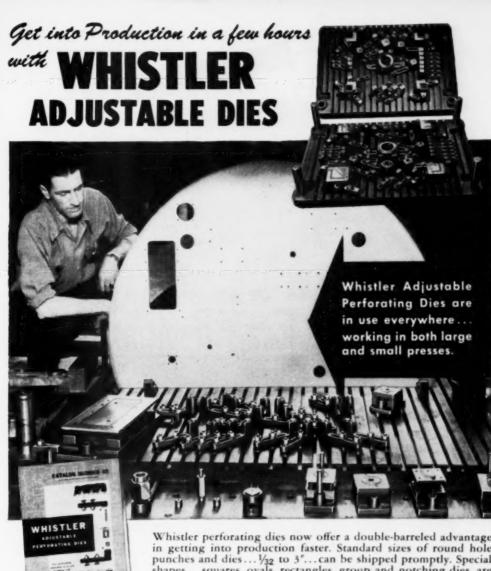
LANDIS Taps are constructed with a built-in collapsing action so that chasers drop free from the work into the tap head at the completion of the thread. Thus the tap can be removed directly without "backing out."

LANDIS Taps are of two styles—the ALT for parallel threads—and the LL for tapered threads. The LL Receding Chaser Collapsible Tap is especially designed to cut API Standard threads in any machineable material well within all required tolerances. LANDIS Taps may be used either as stationary or rotary taps, and can be quickly converted from one type to the other.

Write for Bulletins G-94 and G-95



LANDIS Machine CO. WAYNESBORD PENNA, U. S. A.



There are plenty of other advantages in using Whistler Adjustable Dies. It makes sense to get the complete story. And it's easy to do. Write for your Whistler Catalog today.

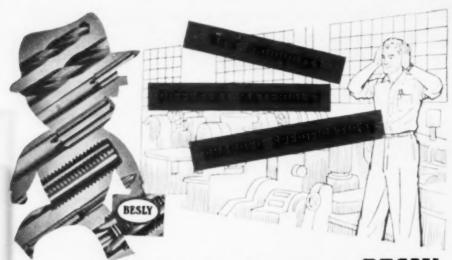
Whistler perforating dies now offer a double-barreled advantage in getting into production faster. Standard sizes of round hole punches and dies... 1/32 to 3"... can be shipped promptly. Special shapes...squares, ovals, rectangles, group and notching dies, are quickly made to order.

Equally important, set-ups are simple...take only a short time. Same units can be rearranged or units added in setting up different jobs. Production is thus speeded while die costs are amortized through continued re-use. No special tools are needed. All parts are interchangeable. The heavy duty series of punches and dies easily pierce materials up to 1/4" mild steel.

#### . B. WHISTLER & SONS, INC.

740 MILITARY ROAD

**BUFFALO 17, NEW YORK** 



# Whether DRILLING OR TAPPING Let BESLY Help You Solve Todays Problems Today!

UNSURPASSED
ACCURACY et



Microcontric CHAMFER



Solid Ground THREAD FORM



"Right"



Mirror Finish



Tru-Square DRIVER Today's conditions demand many a re-check of tap and drill specifications—because most shops are coming up against new materials . . . using substitute materials . . . or tooling up for unfamiliar work. Besly servicemen, today, are using their wide knowledge of drilling and tapping to extend tool life and help you overcome new and difficult job conditions. Their knowledge begins with tool design and carries through to on-the-job application of the best tap and drill for your work . . . whether standard or special. Ask your Besly Distributor to call in the Besly Serviceman to work with you on your "problem" jobs.





TAPS — the TWIST DRITES
world's most AND REAMERS
occurate top. — Complete line



JIKAN ABRASIVE
WHEELS AND
DISCS—Individually formulated
for your job.



GRINDERS that reduce costs enevery type of surface grinding.

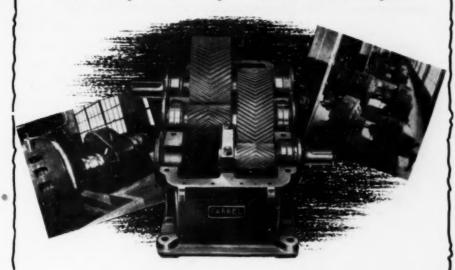
CHARLES H. BESLY & COMPANY



124 N. Clinton Street • Chicago 6, Illinois Factory: Beloit, Wisconsin

#### EACH FARREL SPEED REDUCER

has a special "aptitude" for its job



The design of Farrel speed reducers permits an engineering freedom in proportioning gears, shafts, bearings and even some housing dimensions to meet specific load, speed and service requirements. This flexibility has resulted in the solution of innumerable application problems.

In addition to this feature, Farrel speed reducers have a number of other advantages which help to account for their "aptitude" for handling tough

assignments. The precision gears are generated by the famous Farrel-Sykes process for smooth, quiet, efficient operation; shafts and bearings are factored to safeguard against interruption of vital processes; gear cases are proportioned to withstand repeated heavy peak loads; joints are sealed to prevent entrance of dust and dirt.

Write for further details of these problem-solving units. Ask for a copy of Bulletin 449.

#### FARREL-BIRMINGHAM COMPANY, INC., ANSONIA, CONNECTICUT

Plants: Ansonia and Derby, Conn., Buffalo, N. Y. Sales Offices: Ansonia, Buffalo, New York, Boston, Pittsburgh, Akron, Cleveland, Detroit, Chicago, Portland (Oregan), Los Angeles, Salt Lake City, Tulsa, Houston, New Orleans

# Hanson-Whitney STANDARD TAPS and GAGES NOW STOCKED

MACHINERY

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To better serve our customers in their own territories, Hanson-Whitney Taps will now be merchandised thru a national set-up of Industrial Distributors. Standard sizes and types will be stocked in important tapping centers for fast delivery to more users, over a greater area.

During 1951 we shall back up our Distributors with H-W advertising in 8 publications reaching 1.587,600 readers. We have a new, sturdy, attractive, clearly marked package. Dealer helps will be supplied from time to time . . . and every effort will be made to insure better tapping results at lower costs . . . with recommendations from H-W engineers on request.

Gages may not be completely stocked in the field, but all standard sizes are available for immediate delivery.

#### NEW TAP PACKAGE

Colorful blue, black and whose packages are exally adentified on the shelves. Since and type figures for clearly marked. Taps are septamed in the metal-edged box and further protected with an quante shopping carrier.

HANSON-WHITNEY COMPANY . HARTFORD 2, CONN.

DIVISION OF THE WHITNEY CHAIN COMPANY

Manson Whitney

ILENED PAPE

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SOME TERRITORIES NOW OPEN

FOR QUALIFIED DISTRIBUTORS

#### **OVER 20,000**

and Still Going Strong

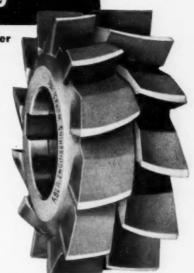
...With An Aber Curved Tooth Milling Cutter

Objectional chatter marks from standard type cutters surprisingly resulted in increasing production from 4,000 to 20,000 pieces per grind

Eight months ago a manufacturer experienced difficulty in obtaining a smooth surface on a side milling operation while using standard type cutters.

Aber "Curved Tooth" right and left hand shear side milling cutters were recommended to eliminate chatter narks. NO THOUGHT WAS GIVEN TO INCREASING PRODUCTION.

The results proved outstanding — After eight months. If continuous operation, without once removing the outers from the machine, Aber "Curved Tooth" cutters produced 20,000 pieces against previous peak outputs ranging between 3,000 and 4,000. In addition the cutters are still producing pieces within specified tolerances and with a finish finer than that obtainable with NEW standard type cutters.



#### Here Are the Facts

#### OPERATION DATA

MACHINE U S Multimiller

TOOL Aber "Curved Teath" right and left hand shear side milling cutter 3"a % a 1 %

MATERIAL Bronze Turbine Blades

#### COMPARATIVE PERFORMANCE

going strong



You too can profit by applying Aber "Curved Tooth milling cutters for increased production and reduced rejections due to off-tolerance, unsatisfactory finish milling operations. Remember every Aber Tool has the exclusive, patented "Curved Tooth" design providing chatterless, smooth cutting action.

ABER SINC.

meximum



#### YOU'LL LIKE THESE Family Features

#### OF THRIFTY CINCINNATI MILLERS

Thrift is a family characteristic of CINCINNATI knee-type milling machines. They have many features that save you money year after year. The five illustrated here are common to all cincinnati ML. MI, Dial Type, High Power and Dual Power Dial Types. They constitute five reasons why it pays to equip your shop with Cincinnatis. Write for catalogs and then compare feature for feature with any other machine. For the long pull, you'll save with Cincinnati.

THE CINCINNATI MILLING MACHINE CO. CINCINNATI 9, OHIO

Cincinnati vertical screws never get stubborn and balky because they're automatically lubricated from an individual reservoir which you can fill with EP oil.

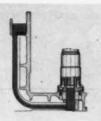
New men need no memory training course to operate a Cincinnati. As the lever is moved, so goes the feed motion; technically, it's independent directional control.

Soothing syrup to fretful cutting, Dynapoise overarms dampen out chatter; pay off in higher feed rates for many setups.

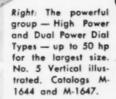
Hydraulic power does the work of shifting spindle speed gears . . . without effort, you can change spindle speeds as often as the job requires.

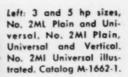
The villain of down-milling, backlash in the table feed screw is automatically eliminated." The unit is built in. Principle of operation is indicated in the drawings at the right.

## CINCINNATI



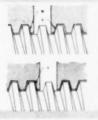














Left: Intermediate power, Nos. 2, 3 and 4 Dial Types; medium speed and high speed; Plain, Universal, Vertical. No. 2 Plain Dial Type illustrated. Catalog M-1623-1.

MILLING MACHINES • CUTTER SHARPENING MACHINES
BROACHING MACHINES • FLAME HARDENING MACHINES
OPTICAL PROJECTION PROFILE GRINDERS • CUTTING FLUID

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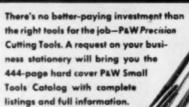
THE PRECISION CUTTING TOOLS YOU NEED

- QUICKLY OBTAINED FROM NEARBY STOCK AT

# RAT

BRANCH OFFICES AT

ND MILLING, DIE SINKING AND KELLERING





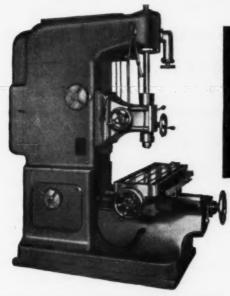


WEST HARTFORD | CORRECTION





IT PAYS TO BUY JTTING TOOLS ON A PERFORMANCE BASIS



# 1 MACHINE THAT DOES THE WORK OF 2

Sixteen Spindle speeds, 40 to 2000 r.p.m.—9 Spindle feeds, .005" to .010 —100" rapid traverse per minute in both directions—16 Table feeds, 5%" to 20" per minute.

#### KNIGHT NO. 50 VERTICAL MILLING & PRECISION BORING MACHINE

✓ SAVES AT LEAST HALF THE SETUP TIME!

✓ ELIMINATES ALL WORK TRANSFERS

✓ SPEEDS UP OUTPUT—REDUCES UNIT COSTS

- Fast, accurate, versatile, simple and easy to operate
- Handles an extreme range of difficult precision work
- Exceptional cross table travel extra long spindle travel — complete selection of spindle and table speeds and feeds
- Rugged bed-type construction assures positive accuracy — 7½ h.p. motor and all-gear drive furnishes ample power for biggest, toughest jobs
- Convenient, quick-action controls full vision work areas — easy setup — all save labor, eliminate lost motion, lower unit costs, boost production!

Mail Coupon - Now!

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Send Mach	catalog ines.	on	No.	50	and	other	Knight	Milling

TITLE

#### It Takes More Than Good Spindle Bearings for Precision Grinding Results

Fine finishes, close tolerances, fast sparkout, high output, dependable operation
—all the signs of real precision grinding performance call for more than just
good spindle bearings. At least, we at
Landis Tool have found that true after
building precision grinders for over
50 years. In Landis Tool grinders the
combination of spindle bearings and
wheel spindle produces the performance benefits so frequently claimed for
the bearing alone.

If you look at spindle bearings, you will find that a number of good types are in use today. Practically all of them, if properly lubricated, will give you minimum trouble. The Landis Tool Microsphere Bearing, however, has one outstanding feature that contributes greatly to the superior performance of Landis Tool precision grinders. That feature is an extremely small running clearance between bearing and spindle. This is made possible by the combination of spindle and bearing design.

Production men understand the importance of short sparkout time to fast grinding. How many know, though, that if the bearing clearance is close, the sparkout time will be cut to a minimum, and the wheel will respond more quickly and accurately to the feed mechanism.

With its close clearance, the Microsphere Bearing delivers this necessary short sparkout time.

Grinding performance also depends on the wheel spindle which the bearings support. When stock removal is heavy, you subject the spindle to bending stresses. To keep spindle deflection to a minimum, the Landis Tool wheel spindle is increased in diameter between bearings. This provides 1½ to 2 times more sectional area between bearings than at the bearings!

The Landis Tool extra diameter spindle provides a rigidity of spindle not found in other grinders. In terms of performance, this means a fine finish, free from spindle flutter.

The combination of the close operating clearance of the Microsphere Bearing and the rigidity of the increased diameter spindle delivers fine finishes, close tolerances and maximum output.

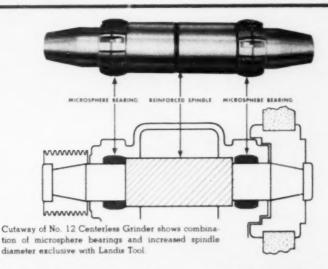
Two unusual applications illustrated on the opposite page demonstrate the importance of the Landis Tool combination of Microsphere Bearing and extra diameter spindle.

For more information on why it takes more than good spindle bearings for precision grinding results, we will be glad to send you a copy of the booklet "Microsphere Bearings."

LANDIS TOOL COMPANY, WAYNESBORD, PENNA., U.S.A.



One Piece Microsphere Bearing Steel Construction—Babbitt Lining Used Only On Landis Tool Precision Grinders



Unusual Applications Demonstrate Importance of Microsphere Bearing and Reinforced Spindle Construction



Two spaced wheels mounted at end of spindle with wheel base set at 30° angle.



Grinding a foil finishing roll to a 2 micro-inch finish on a Landis Tool 12" Universal.

LANDIS TOOL

Precision Grinden

FOSDICK

Reproduction Machine

with
AUTOMATIC
PUSH-BUTTON
POSITIONING

NEW AUTOMATIC POSITIONING UNIT PROVIDES FLEXIBLE MACHINE CAPABLE OF BORING OR DRILLING DUPLICATE WORK WITH SPEED AND ACCURACY.

This new No. 42P reproduction machine with automatic table positioning makes possible a plus or minus .0001" accuracy merely by pressing a button on the control panel conveniently located at operator's position. Two electrical cycles then quickly bring table to the desired position. Push buttons for rapid traverse in and out, right and left are provided and safety switches protect machine in all directions.

This new machine eliminates expensive boring and drilling jigs—no longer is your product design frozen because of high jig costs. New design, special parts, frequent changes are now handled with ease.

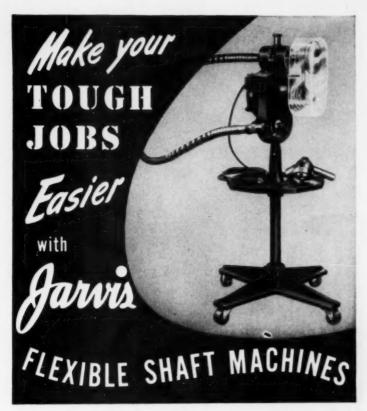
Production is increased and simplified through the use of duplicating bars made quickly on the machine itself from 5/8" square stock.

Increase, improve, modernize your production with the new Fosdick 42P machine with automatic Push-Button control.

Folder and complete catalog sent gladly upon request. Catalog Number MMSJP.

**FOSDICK** 

MACHINE TOOL CO.





Dependable Jarvis Flexible Shaft Machines make your tough jobs easier - do them faster and more economically. Made to meet your individual requirements for grinding, cutting, buffing and many other operations, Jarvis Flexible Shaft Machines are available in bench, floor or overhead types - single or multiple speeds. Factory trained Jarvis representatives are ready to help you select the machines best suited to your own applications.

Long-lived Jarvis Rotary Files, depended upon the world over, are available in many shapes and flutings. For detailed information on Jarvis Flexible Shaft Machines and Rotary Files, write to The Charles L. Jarvis Company, Middletown, Conn.



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THE CHARLES L. JARVIS CO., MIDDLETOWN IN CONNECTICUT





#### no other has so firm a grip...

Thanks to its ball bearing construction and frictionless grip, the Jacobs Ball Bearing Chuck easily registers the world's firmest grip—eliminating tool slippage and reducing drill breakage. That is why it is preferred the world over for heavy-duty drilling under toughest conditions.

#### no other is so widely used . . .

The Jacobs Plain Bearing Chuck is especially designed for portable drills, light, and medium-dury drill presses and Jathes. Its high accuracy, rugged construction, tremendous strength and gripping power have made it industry's overwhelming favorite, here and abroad.

See your Industrial Distributor for the complete line of Jacobs Chucks. The Jacobs Manufacturing Company, West Hartford 10, Connecticut.

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NEW LOW COST

# GARDNER



Increase production by grinding

TWO surfaces in ONE operation



Horizontal work carrier permits quick, easy loading of small coil springs

101149

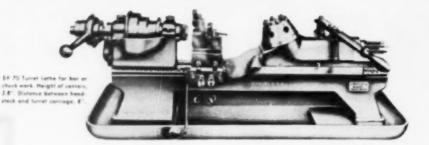
For lower production costs investigate the Gardner TWO in ONE method



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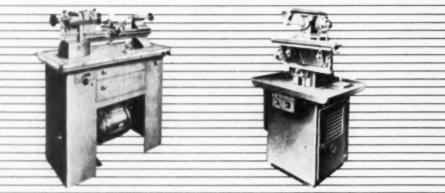
GARDNER MACHINE COMPANY

428 East Gardner Street . Beloit, Wisconsin, U.S.A.



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These SV Machines fully warrant your inquiry for complete information. They have contributed greatly toward winning for the Schaublin line a fine reputation for the adaptability and precision that are highly prized by toolmakers. Factory service, interchangeable units and accessories are available from American warehouses. Consult us on your tool-making problems.



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Jig Borers, Jig Grinders, Optical Measuring Machines, Profile Projectors and Burnishing Machines.



SWISS PRECISION SWISS DEPENDABILITY ACCURACY



for drilling — wide range of speeds, dependable accuracy. Capacity to



For surface grinding — flare cup or recessed wheel equips drill press to handle many grinding operations.



For precision high-speed tapping - simply install tapping attachment on machine spindle.

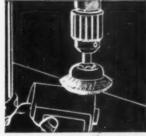
DRILLING is only one of many jobs you can do with a

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SOLD ONLY THROUGH AU



- a wire end brush attached to spindle, with the easily controlled pressure of the drill press, does the job



For removing rust, scale and point For spot polishing and finishing use an improvised polishing tool and run drill at slow speed.



For obrasive polishing of valves a simple, easy operation with the above set-up. Abrasive cloth, backed by rubber, does the polishing.

DRILL PRESSES . RADIAL DRILLS . TILTING ARBOR SAWS . BELT and DISC SURFACERS METAL-CUTTING BAND SAWS . METAL-SPINNING LATHES . SPINDLE SHAPERS . JOINTERS

# Identical Twins.



# Rugged Individualists? Look Closely at these 2 MORSE TWIST DRILLS

At first glance, they look alike. But look again, and you'll see a difference. The drill at the left, with a 90° point angle and highly polished flutes, is specially designed for plastics. The drill at the right, having a 118° point angle and highly polished flutes, is for use in brass.

This is the obvious. Laboratory examination will reveal differences in hardness, flute contour, land width — all necessary in terms of the job each drill is destined to do.

Now you can see the care with which Morse Cutting Tools are engineered — individually — for every purpose . . . why they give top production and consistent accuracy on every job. And if you need even greater production, specify MORSE — Electrolized!

Remember that Morse Quality is sold only by your Morse-Franchised Distributor . . . and call him on all your cutting-tool orders.

Morse Twist Drill & Machine Co., New Bedford, Massachusetts (Div. of Van Norman Co.)

Branch Warehouses in New York, Detroit, Chicago, San Francisco

# MORSE

#### Only MARVEL builds all four\*

While it is true there are several builders of hack sawing machines and many builders of band sawing machines, only MARVEL builds BOTH hack saws and band saws. The fact is that MARVEL manufactures 35 models of 10 basic types of metal sawing machines which include the world's fastest automatic production saw, the world's largest giant hydraulic hack sews, the world's most versatile band saw and the most widely used small shop saws.

With intimate and broad field experience in all types of metal cutting-off equipment and 35 different saws available, it is obvious that MARVEL Field Engineers occupy a unique and exclusive position in the industry. They are eminently qualified to make expert and unbigsed recommendations covering the type, size and model of metal sawing equipment best suited to individual requirements-the most efficient, most accurate, fastest, broadest in scope and the most economical

MARVEL is also the only manufacturer of both metal sawing mochines and metal sawing blades. Because the efficiencies of both the machine and the blades are interdependent, each upon the capability of the other, expert knowledge covering both saws and saw blades is essential to the proper appraisal of any specific sawing situation. Correct balance of cutting speed and blade life, feed pressure and blade fension are all potent factors in over-all performance. Here again it is the MARVEL Field Engineer who is qualified to provide the comprehensive answer to your question. His job is to help you saw metal most efficiently-his services are available upon request-gratis.

Write for Catalog 49

ARMSTRONG-BLUM MFG. CO.

5700 Bioomingdale Ave., Chicago 39, U.S.A.

to BA Marvel Book Saw

- \*HACK SAWING MACHINES
- \*BAND SAWING MACHINES
- \*BAND SAW BLADES
- \*HACK SAW BLADES

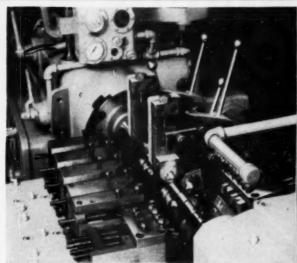


MARYS, High Speed Edge

WACK NAW BLADE

#### MACHINE OF THE MONTH

PREPARED BY THE SENECA FALLS MACHINE CO. "THE So-owing PEOPLE" SENECA FALLS, NEW YORK



Left: Closeup view of tooling and steady rests.

Below: Model LR Loswing Lathe equipped for machining spinning rolls.



MODEL LR So-swing LATHE

#### SPEEDS SPINNING ROLL PRODUCTION

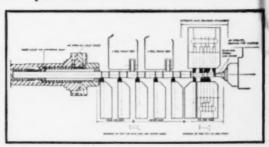
Problem: To turn and face long spinning rolls within close tolerances.

Solution: The Model I.R Automatic Lo-swing Lathe selected for this job was equipped with a hollow spindle to permit one-half of the spinning roll to extend into the spindle. This method increased the rigidity of the work and assured closer machining tolerances. The upper right illustration shows the lathe equipped for the first turning operation. Note the relieving type tailstock which swings on hinged joints to facilitate loading work into the collet chuck. The upper left illustration is a closeup view of the tooling and steady rests.

The spinning rolls are turned from ground stock, properly centered on each end. They are supported by the collet chuck, two 3-roll rests, and a tailstock center, as shown in the tooling layout below. This method holds the work very rigidly and assures the close tolerances specified on the turned diameters.

The entire operation is automatic; the operator simply places the roll in position and locks the steady rests on the previously ground bar stock. The machine cycle is then started and continues automatically until all diameters are turned and faced, and the tool slid returned to the starting position. A similar machinand tooling is used for machining the opposite end of the shaft.

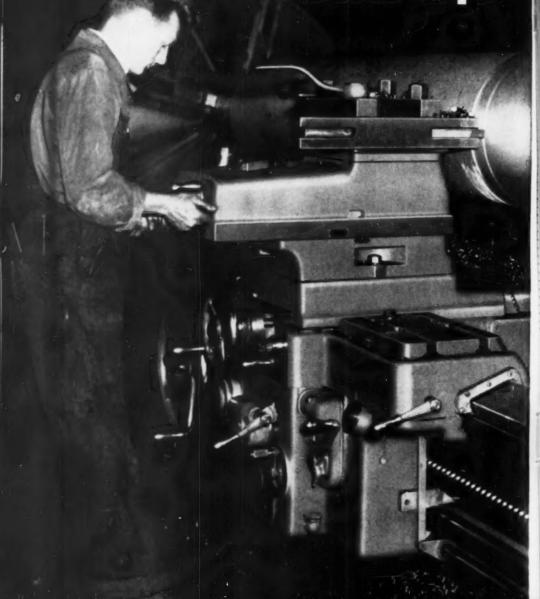
Let Seneca Falls engineers assist you with your turning problems.



SENECA FALLS MACHINE CO., SENECA FALLS, N. Y.

PRODUCTION COSTS ARE LOWER WITH So-swing

6000 h.p.



will go through this shaft!



This tailshaft turns the screw in a C-2 Cargo Vessel. It's made to take the relentless pounding of a 6000 h.p. power plant for weeks without letup.

To machine it accurately and economically, Moore Dry Dock Co. of Oakland, California needed a powerful precision lathe. That's why they gave the job to a new LeBlond 50" Heavy Duty Lathe . . . recommended by LeBlond Distributor, Bulotti Machinery Co. of San Francisco. Result? 17 hours off former machining time with a cost saving of 18%.

This LeBlond Lathe provides fifty horsepower; spindle speeds up to 247 r.p.m.; rigid construction. It makes possible latest turning techniques with carbide tools; gives better finish, closer tolerances and greater economy.

Operators' work is easier, too, because of convenient features—singlelever feed control, exclusive power rapid traverse and many more.

Whether you turn ten-ton shafts or ten-ounce bushings, there's a LeBlond Lathe to turn them faster, better. Your nearby LeBlond Distributor will tell you about the 50" Heavy Duty and other late model lathes. Call him or write—

THE R. K. LEBLOND MACHINE TOOL CO., CINCINNATI 8, OHIO

Ask for Bulletin HD-180 E for more information on the 50" Heavy Duty.

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TROLS-less time between cuts because operator can reach every control lever including arm and column edjustments without moving feet or bending back.

VARIETY OF SPEEDS AND FEEDS - do a better job faster because the right combination of speed and

AUTOMATIC LUBRICATIONinitial accuracy is proyears on end by automatic lubrication. The entire head is positively lubricated.

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feed is instantly selected. \* COMPLETELY CENTRALIZED CONTROL

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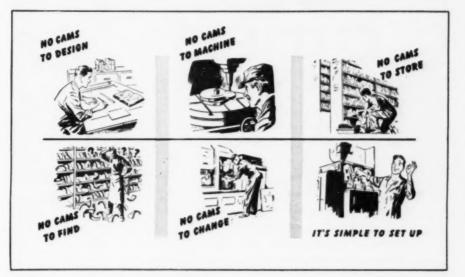
For more than 30 years, MORRIS Mor-Speed Radial Drills and Production Machines have been a standard of accuracy and low-cost production in all branches of industry. For further details on Morris Radial Drills, write for bulletins. If you have a problem involving production drilling, boring, reaming, facing or tapping in any combination of operations, consult Morris Engineers.



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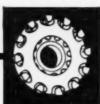
The modern Lovejoy line of milling cutters, boring tools, arbors, flywheels, etc., plus outstanding field service, can help you cut your production costs, just as it has for others.

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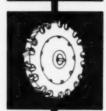








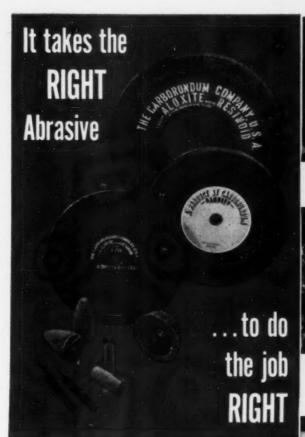












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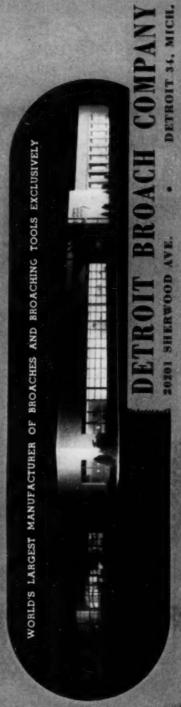
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DETROIT BROACH CAN CUT YOUR COST-PER-PIECE

- Developing broaching setups to replace other, more costly machining methods.
- Redesign present broaches and broaching set-ups to and broaching set-ups to make them more efficient.

Two milling machines and two operators per shift, two shifts a day, were required to produce the rack teeth and finish the jaw face on 8000 placed the milling operations produces the same number of parts with one operator, one machine, on one shift per day ... savings in labor alone movable wrench jaw forgings. The Detroit Broach set-up which has reamount to \$2112.00 monthly! And that's not all.

of tool maintenance is reduced materially. In respect to quality, the manu-The original tool cost for the broaching set-up was lower and the cost facturer reports much better surface finish, more consistent dimensions, uniformity of parts. If you are boring, slotting, reaning or milling your parts, chances are today? Detroit Broach engineers will gladly discuss your operations and that Detroit Broach can reduce your cost-per-piece. Why not investigate give you actual cost and production data on broaching them.





# HANDLES MORE JOBS THAN ANY OTHER CHUCK!



#### THIS IS HOW IT WORKS

Pinion "A" moves jaws in or out to grip work like any scroll chuck. 4 apposed screws "B" (only 2 shown) bring work to dead center. It's as easy as it sounds. Inexperienced men can center work within .0005 in 3 minutes! Once set dead true, you can machine hundreds of duplicate parts without changing adjustment!

- .0005 precision with scroll chuck rechucking speed.
- 2. Handle collet and step-collet work.
- 3. End most stub arbor, mandrel needs.
- Adapt to dividing heads, grinders, screw machines, lathes.
- Minimum overhang grips work closer to spindle for greater accuracy.

THIS is the most amazing chuck advance in 50 yearst One Buck chuck—at ordinary scroll chuck cost—will handle the work of special equipment worth \$250 or more! Take collet work for example. Buck chucks have spindle capacity by .001 from  $\frac{1}{2}$ " to  $1\frac{1}{2}$ ". 6" chucks have step collet capacity—by .001 from  $\frac{1}{2}$ " to 5". That's part of the story. Send for all of it.

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Kalamazoo, Mich.



CHUCK



6 STEP-JAW COLLET CHUCK 3 sixes— 4-, 5-, 6-



PRODUCTION COLLET CHUCK 3 sizes— 4", 5", 6"

FLORIDA EAST COAST



Keeps 'Em ON SCHEDULE

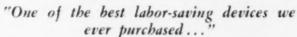


Buffalo

#### UNIVERSAL IRONWORKER

Helps Keep Maintenance On Schedule

At left, the "Buffalo" U.I.W. in the St. Augustine Shops of Florida East Coast Railway is simultaneously cutting bar and notching angle. Here's a multi-purpose machine that turns out scores of fabricating jobs in a hurry.



that's the word of the Maintenance of Way Engineer of this progressive road. And users in steel mills, other heavy industries, give the same report. For here, in one machine, you can punch, shear angles, cut bars, slit plates, notch and cope—and do it at full speed 24 hours a day. A U.I.W. will pay for itself in your shop in short order. WRITE FOR BULLETIN 322-0, for full details.

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**PUNCHING** 

February, 1951

DRILLING

MODERN MACHINE SHOP

BENDING

33

#### SPECIFY CARBOLOY











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LOW COST...GREATER AVAILABILITY

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delivers maximum productivity with carbides!

You can get even greater productivity out of carbide tools with the Carboloy "Triple C" Plan of Coordinated Carbide Control. The CCC Plan Book explains in detail just how this plan works and how you can use it in your own plant.



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- Maximum machine speeds
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Carboloy Standard Tools can be adapted to do up to 80% of your single-point tool machining! They can be used to machine any metal or non-metallic material and deliver unmatched performance on steel cutting. And Carboloy Standard Tools are comparable in price to many high-speed steel tools, and in many sizes are actually cheaper.

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or This where you have only the tool to handle.

It's obvious that flexible shaft driven tools like the concrete surfacer at the right, where you don't have to handle the weight of the motor, are easier to manipulate and much less tiring — which means better work and more of it with such tools. With S.S.White flexible shafts you can give any portable tool this big advantage. Remember this when you design portable tools — and remember too, S.S.White will be glad to help you work out the shaft application.



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Without Floor Damage

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#### THE FIRST DEPARTURE IN BASIC ENGINE LATHE DESIGN

## The First Totally Different Lathe in Over 100 Years...

Now ELIMINATES MAKESHIFT MACHINING OF SHORT,
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In the opinion of practical men from many branches of industry and leading metalworking publication editors, the problem of facing, turning and boring thin walled section work of large diameter and short length has been solved. The Lodge & Shipley T-Lathe, "a radically new 60" right angle chucking fathe, eliminates the slow, costly, inaccurate and inconvenient use of raised or gap engine lathes or vertical buring mills on this class of work.

With speed, sensitivity, accuracy and accessibility formerly thought impossible, the I-Lathe is far more compact, far less expensive than conventional machines. The bed is in the shape of a. T. The section of the bed carrying the carriage is at right angles to the center line of the lathe.

The Lodge & Shipley T Lathe is not a single purpose machine. Developed by Lodge & Shipley in conjunction with Prair & Whitney Experimental Dissume of the nation's leading turbo-jet engine manufacturers, for use on jet engine shrouds and similar parts, it is extremely versatile. Also, this lathe has been designed for tracer control and variable speed drive if required.

At last, by the application of this new Lodge & Shipley T-Lathe, you can machine with maximum efficiency a wide range of thinwall, short length work of varying diameter.

Perhaps you can use the T-Lathe profitably. Write for detailed information.

Lodge & Shipley

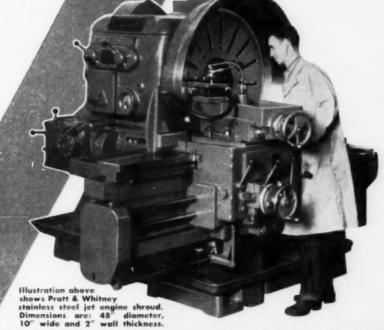
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**60" RIGHT ANGLE CHUCKING LATHE** 



#### CAN YOU USE THE LODGE & SHIPLEY T-LATHE?

If you machine large, short length work, the T-Lathe may eliminate makeshift machining for you. The T-Lathe can be supplied with 4 different headstocks and other modifications to suit your work. Check these condensed specifications for model illustrated.

Maximum swing
Diameter of std. face plate
Facing carriage travel31" to front 6" to rear
Compound rest travel12" forward 4" back
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octifications for model most area.	
Std. maximum length of workpiece	
Std. range of spindle speeds24 speeds: 4-225 RPM	
Std. range harsepower ratings	
Range of feeds55 feeds: .001"064"	

speed generator



Holes for mounting bracket on a Lindberg-Fisher Tiling Pot Farnace are drilled with a powerful Model 283 SKIL 1/2" Drill. Selected for its hard-driving performance, this SKIL Drill takes care of all holes that cannot be drilled or punched on stationary equipment.















SKIL Drills

SKIL Shear SKIL Grinders

# assembly at Lindberg Engineering Company

# SKIL 1/4" and 1/2" Drills cut costs, save time on production lines...

Walk through the large Lindberg shops. You'll find real production efficiency . . . and you'll find fast-working SKIL Drills . . . in every department. See how easily they handle on every job and on every operation where electric drills are used. Like other leading manufacturers everywhere, Lindberg has relied on SKIL equipment for years.

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Model 825 SKIL Saw is used in the hibping department to saw lumber for a large exposerate. Lindberg says, "SKIL Saws are used for work of this type of eliminate walking back and forth to the stationary saws, resulting in a great sawing of time."



Holes for mounting water jacket covers on Lindberg HYEN Atmosphere Generators are drilled with a Model 45 SKIL 14" Drill. Model 45 is a favorite with men and women workers for its compact, lightweight construction; easy grip: effortless bandling and its fast drilling in tight spots.



SKIL Grinders



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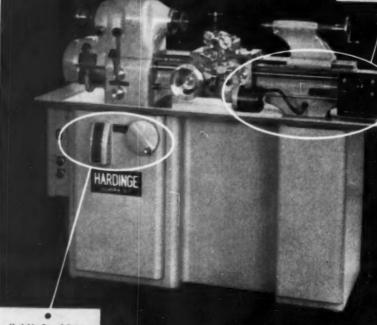
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Longer drill life ... More holes per grind
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For grinding right hand 2 and 4 lip twist drills from \( \frac{\pi}{a} \)" to 3" diameter, 3 lip drills \( \frac{\pi}{a} \)" to 2\( \frac{\pi}{a} \)" diameter.

GP DRILL POINT
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Thins and centers standard 2 lip twist drills from ½" to 3" diameter

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The Sellers method of grinding automatically produces the scientifically correct drill point required for precision work. Angles of inclination are equal, contour of lips is identical, resulting in a point that drills cylindrical holes faster with more holes per grind.

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For grinding right hand 2 and 4 lip twist drills from ¼" to 2" diameter, 3 lip drills from ¾" to 2%" diameter.

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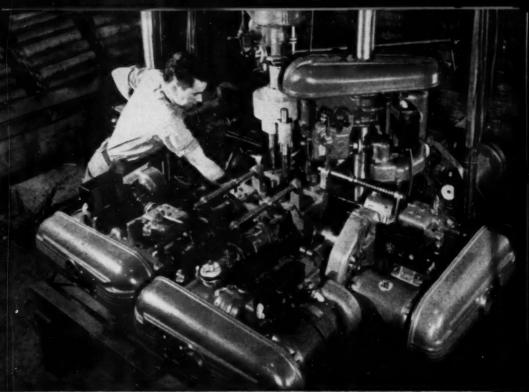
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When you think of drilling think of Deltat Your own imagination plus the amazing adaptability of standard Delta drill presses or components can crack the toughest problem. Look what the Heil Co. did (at right, above) with 8 Delta heads! One operator drills 19 holes in a casting — in a floor-to-floor time of 2.6 minutes! And at a fraction of the cost of a special-purpose machine, or a multi-station operation!



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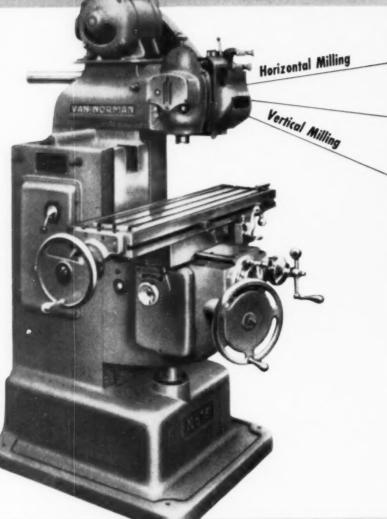
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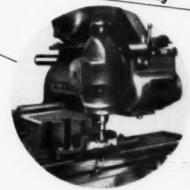


It pays to Van Normanize

46



Angular Milling





### **VAN NORMAN**

## NO. 16 RAM TYPE MILLING MACHINES INCREASE PRODUCTIVITY

This Van Norman No. 16 Miller gives you many outstanding and exclusive advantages that assure more workability for your plant.

The adjustable cutterhead, which permits vertical, horizontal or angular milling on one machine, cuts idle machine time by as much as 50%. The moveable ram plus the saddle cross feed increases the work range and capacity of the miller . . . enables you to handle larger work pieces with ease. Single lever built-in

electrical control simplifies operation. Spindle speeds from 95 to 2,000 rpm give you the right speed for every type of cut. Add such construction features as hardened alloy steel gears, large hardened alloy steel multi-splined shafts, precision-ground feed screws, one-shot metered lubrication and you have a milling machine that provides greatest productivity, lowest cost milling and long operating life.

Write for bulletin, today



VAN NORMAN COMPANY
Springfield 7, Massachusetts



### Hole Location Practices

Published in the interests of greater accuracy and quality in the toolroom and on the production line by the Moore Special Tool Company, Inc., 730 Union Avenue, Bridgeport 7, Conn., builders of Jig Borers, Jig Grinders, Panto-Crush Wheel Dressers, Die Flippers, Motorized Centers and a complete line of Hole Location Accessories.



#### Now...Jig-Ground Contours

When first conceived by Moore 12 years ago, the Jig Grinder was designed primarily to position accurately and grind cylindrical as well as conical holes, with taper in either direction. Continuing development and user-experience have since revealed a wider scope of applications particularly in grinding contours. Result a completely redesigned and larger Moore Jig Grinder (Fig. 1)

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PRECISION HOLE LOCATION contains many examples of jig-boring and jig-grinding practices similar to one described here. 448 pages, 400 illustrations. Over 7500 copies of this authoritative book have been sold to date. 184 pages of Woodworth Coordinate Location Tables from 3 to 100 holes. Available at special price of \$3 in U.S.A., \$1.50 elsewhere. Send check or money order to Moore Special Tool Co., Inc., Bridgeport, Conn.

that contour grinds, chop grinds and Moore Jig Grinders and Jig Borers. slot grinds as easily as it hole grinds.





Fig. 2, is an excellent example. The two-station section was ground complete with proper draft in only 25 hours. Previous time, including filing, stoning and template work, was 80 hours.

Every contour and surface was also checked in the Jig Grinder by coordinate measurement with the lead screws, an important feature of

The right side of the blank die Press tools such as lamination and (Fig. 3) was ground with the regusimilar dies have various combina- lar grinding head. The corners, slots tions of radii, tangents, angles, and and projections on the remaining flats, all of which must be accurately three sides were done with the new ground to size and location. The slot-grinding attachment (Fig. 4). ordinary lanunation die, shown in Properdraft (including corners) was ground around the entire contour with the taper-setting attachment.

> Ask for a free reprint of an eightpage article on the design of the No. 2 Moore Jig Grinder which appeared recently in MACHINE DESIGN.





When production depends on tools and dies, tools and dies depend on the LINDBERG TOOLROOM TEAM—a basic requirement in every toolroom—a must where you want the ultimate in tools and dies which will keep your production rate up and your machinery running with a minimum of tool and die failure. THE LINDBERG TOOLROOM TEAM gives you the precision heat treating which your precision tools and dies need for lasting performance.

LINDBERG HARDENING FURNACE — eliminates finishing due to scale and decarb with simple accurate atmosphere control.

LINDBERG TEMPERING FURNACE — allows you to obtain the exact "Rockwell Hardness" required for each specific tool or die.

For tools and dies requiring high speed tool steel—investigate the Lindberg "L" Type combination preheat—high heat Furnace.

#### LINDBERG FURNACES

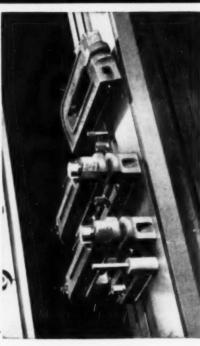


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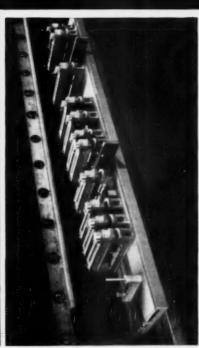


Showing a Wales "Strip" Template laying across the Bed Rail. Note the hole pattern in the template for the pilot pins in the independent, self-contained Wales Hole Punching and Notching Units. This template fits into the channel in the press briefs rail.



Showing an End Stop and two Wales Type "BL" Hole Punching Units set up on a "Strip" Template in the Bed Rail. The third Unit is ready to be bolted down.

# You don't need expensive die sets with WALES HOLE PUNCHING UNITS



A Typical hole punching set-up ready to operate. Note the elimination of expensive



Illustration shows a combination set-up of Wales Type "BL" Hole Punching Units and Type "N" Notching Units with work in foreground.

■ The exclusive Wales "Strip" Template Mounting Method for press brakes provides faster set-ups, reduced press "down-time" and easier storage of templates,—all without the use of die sets.

As shown at the left, this Mounting Method is made in 2 parts — (1) the Bed Rail and (2) the "Strip" Templates that fit into the bed rail channel. In this way, the Bed Rail remains in the press and the "Strip" Templates are interchanged for unlimited set-ups.

The hole locations are drilled and reamed in the "Strip" Templates for the pilot pins that are concentric with the punches and dies in all Wales independent, self-contained Units. In many cases, holes for several set-ups may be drilled in one "Strip" Template. The press ram does not have to be adjusted between set-ups due to the uniform shut height of Wales Hole Punching and Notching Units. In addition, the same group of Units may be used on an unlimited number of "Strip" Templates.

THE MULTIPLE SAVINGS IN TIME AND INVESTMENT with Wales Equipment is too BIG a story to tell in this space, so write for fully-illustrated, functionally-colored Catalog BL and Catalog N today.

# WALES-STRIPPIT CORPORATION

GEORGE F. WALES, Chairman

398 PAYNE AVE., NORTH TONAWANDA, N. Y.

(Brivers Buffele and Ningara Fells)

WALES-STRIPPIT OF CANADA, LTD., HAMILTON, ONTARIO Specialists in Punching and Notching Equipment

# NEW SMALL HONING MACHINE by FULMER

#### **Major Specifications**

Honing Capacity-1/4" to over 4" Stroke-15" maximum Reciprocating speeds-I to 70 fpm. Coolant Capacity-45 gal. Spindle Speeds-3 Spindle Drive Motor-3 HP

Hydraulic Pump Motor-2 HP Hydraulic Oil Capacity-25 gal. Spindle Diameter-11/4 Vickers Hydraulic System

THE new Model 415 Fulmer Honing Machine is designed for fast, heavy-duty honing of a wide range of small, precision work. Stroke and honing capacity make this machine ideal for the highly accurate finishing of automotive cylinders, sleeves, dies, refrigerator and compressor cylinders, connecting rod bores, bushings, bearings, valves, etc. lobs can be quickly and easily changed, making honing of a wide variety of short run work profitable and practical for the large or small shop.

Honing operations are completely push-button controlled. Reciprocation is full hydraulic with spindle and honing tools hydraulically counterbalanced at all times. A special work table with built-in indexing cylinder holding fixture is available to replace the Tee-slotted table. Various types of fixtures are also available. along with honing tools from 1/4" diam upwards, to make a complete honing package, with one source of responsibility for honing results.

Investigate the new Model 415, and the Fulmer Complete Honing Package-the greatest value in the honing field. Write for details and complete specifications.

C. ALLEN FULMER CO. 1233 First National Bank Building CINCINNATI 2. OHIO

New Fulmer

Model 415

Hydraulic

Honing Machine



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problems. There's no cost or obligation, of course.

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THE STANDARD LINE: Drills - Reamers - Taps - Dies - Milling Cutters - Ead Mills - Nobs - Counterbores - Special Tools

# FEATURES

#### MASTER MILLING ATTACHMENTS

PRODUCTION - TOOL ROOM - EXPERIMENTAL

AND MAINTENANCE SHOPS



LATHES TURRETS MACHINES





MILLING ON LATHE-Model "M" I'm b. p. milling fo" keyway



MILLING ON TURRET - Medel '8 with 90' milling head mounted on rear cross slide



ON MILL One or two mills used on post assembly for single er explicitle exiting suits. Mounts on average for vertical milling or steel ways for sed milling head

#### 3 SIZES . CAPACITIES

Model "C" - Is h. p. meter - 9" to 13" swing Model "8"-15 or % h. p. motor-14" to 18"

swing lather
Model "M"—1 or 11s h. p. mater—16" to 72"
Slotting and Keysoating Hood
swing lather

The Master Lathe Converter is a precision multi-purpose machine tool attachment adaptable on most all basic shop machines. The basic unit does milling, drilling, boring, and has eight interchangeable heads for milling, drilling, grinding, slotting, keyseating, and indexing. Spindle speeds, 50 to 15,000 rpm. It provides complete markining facilities with minimum equipment investment, produces more operations per set-up thus increasing production of your present equipment, saves work trainler, assures accuracy, is simple and fast to set up. Prime and subcontractors are converting their present equipment for special applications and production with the multi-purpose Master Lathe Converter

COMPLETE SHOP KIT - This group of equipment includes basic milling unit, external and internal grinding heads, 90" universal and hi-speed milling heads, slotting or internal hervesting head, 40 to I geared dividing head, seven arbors,

in a heavy plywood shop cabinet. This kit provides facilities for most all machine shop operations on a lathe at a fraction of the investment required for individual machines, plus wide use on other basic shop machines. Ideal for maintenance and repair, tool room, experimental, mobile units, absend ships, and production shops.

- # MILLING # DRILLING # BORING
- \* THREAD MILLING \* GRINDING
- # SLOTTING # INDEXING
- \* INTERNAL KEYSEATING

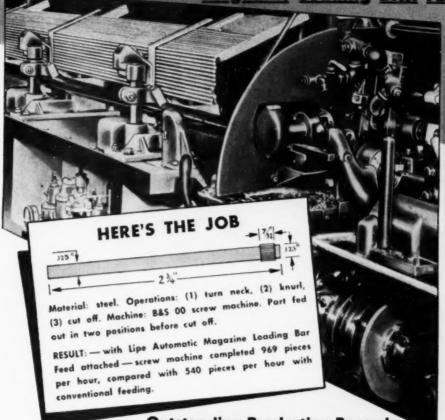


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- Stock is fed to screw machine all the time not dependent upon operator.
- With Model AML you get maximum output of screw machine No "cutting air."
- Pressure constantly behind stock.

- Eliminates feed fingers.
- Avoids multiple feed finger feed-outs.
- Saves in changeover set-up time.

Get full details on how this machine will increase production and save you money. It's today's big advancement in screw machine stock feeding. Our engineers are glad to study your problem . . . no obligation.



Lipe - ROLLWAY CORPORATION

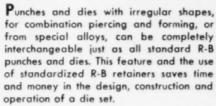
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#### TOOL GRINDER

For Carbide, Stellite, or High Speed Steel Tools.

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Heavy Duty Wet or Dry 10" - 14" Wheels

#### Type TD

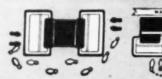
10TD 10" - 14TD 14"

#### Twin Wheel Tool Grinder

(Also SINGLE CUP WHEEL)

GRINDERS -- ALL KINDS!
UP TO 100 H.P.
BUFFERS -- POLISHERS
UP TO 60 H.P.
ABRASIVE BELT MACHINERY

SPECIAL MACHINERY



#### OLD WAY

Lost time between rough and finish grind.

Floor space wasted— Grinder must be away from wall.

#### NEW WAY

One step from rough to finish grind.

Conserve floor space — place Grinder against the wall.

Positively no spray or splash when grinding wet!

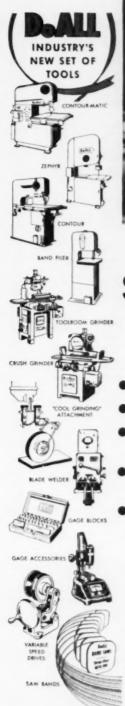
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#### THE STANDARD ELECTRICAL TOOL CO.

2487 RIVER ROAD

CINCINNATI 4, OHIO

GRINDERS-ALL KINDS! UP TO 100 H.P. BUFFERS-POLISHERS UP TO 60 H.P. ABRASIVE BELT MACHINERY. SPECIAL MACHINERY.





# NEW DOALL Contour-matic SIMPLIFIES MACHINING of ANY MATERIAL

- Machines every known material
- Saws, files, polishes, grinds, hones
- Combines tool room accuracy with production speed
- Hydraulic power controls make it easy to operate
- Saves time of other more expensive machines

The real time and money saving features of the DoALL can be demonstrated on your own work—in your own plant. Phone your DoALL Sales-Service Store or write...

Wood Heat-Treated Steel Rubber Books Paper Asbestos Duralum: Magnesium Brass Lead Granite Leather Cork Cellophone Parchmer Bakelite Broke Lining Formica Lucite Masonite Plexiglas Piping Zinc

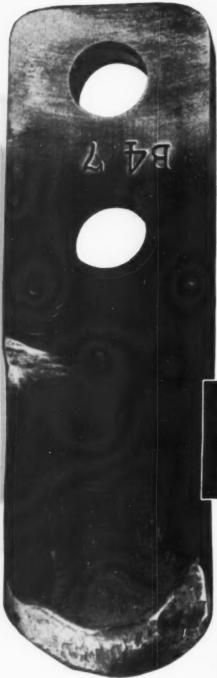












double service. This punch gave



# gives you more runs for your money B24 HOT WORK STEEL

... anywhere from 1½ to 5 times the Performance!

SOME TYPICAL EXAMPLES



dummy blocks, vs. 903 12% tungsten types, exmany brass and copper tubes. dies outperformed 12% truded more than twice tungsten type 11/2 to 1.

tungsten. 5% chromium types, extruded twice as many copper and brass tubes and rods. B-47 B-47 dummy blocks, vs. 5% outperformed 12% tungsten-12% chromium type.

punches, vs. low-c., bon 18-4-1 type, hot pierced more steel axes. See top picture. than twice

as many eyes in mium type, hot extrusion forged 11/2 times as many automotive steel front axle spindles. punches, vs.

gear forgings. B-47 die inserts. vs. regular insert material, per-B.47 die inserts, vs. 9% tungthan twice as many steel side formed better than 5 to 1. sten types, hot pressed

B-47 die inserts, vs. 9% tung-sten types, extruded 1½ times as many high alloy steel autoered a very difficult iob for any grade of hot work steel.

# SEND NON

for "Blue Sheet" on Grade B-47

forging dies, and hor This four-page folder gives technical data on B-47 for brass extrusion dummy block and dies, valve extrusion die inserts, hot punch tools. forging die inserts, press work in general. Write for your copy today.

ADDRESS DEPT. MS-14

Looking for a better hot work steel? type whose superiority is established those summarized above. All tests show that B-47 has unusual resistance You'll find it in B-47-an improved chromium, tungsten, cobalt, vanadium by actual performance runs such as to shock and abrasion at elevated temperatures.

B-47 has given excellent results on difficult hot work jobs on steel. B-47, when properly heat treated, exhibits a well rounded combination of red hardness, toughness, and resistance to wear and heat checking that makes it a valuable addition to the Allegheny Developed originally for applications in the copper and brass industry, Ludlum group of hot die steels.

Put B-47 to the test. You'll find that

it will do any number of severe hot work jobs without washing out or changing size. Get in touch with A-L, today. Let us help you to use B-47.

**△**\LEGHENY STEEL CORPORATION 

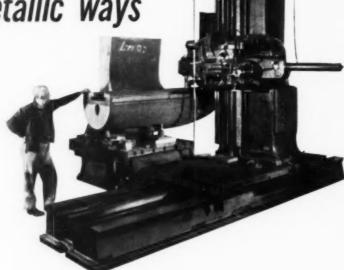
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TOOL STEEL DIVISION: DUNKIRK, N. Y.

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GILBERT
non-metallic ways



### WIN with NO SCORE

At The Thompson Grinder Co., Springfield, Ohio, abrasive dust unavoidably present in the atmosphere made it pretty rough on the original cast iron ways of this Cincinnati Gilbert floor type horizontal boring mill. Six months was about the best service life obtainable before resurfacing of the ways became necessary.

The scoring problem was completely eliminated with Cincinnati Gilbert non-metallic way blocks installed under the column base. Now, after 26 months of heavy duty service—16 hours a day, 5 days a week—the mill has maintained original accuracy—and still no score... This is just one of many practical reasons for specifying "Cincinnati Gilbert" on your next boring mill purchase. Write for Bulletin 1244-B... The Cincinnati Gilbert Machine Tool Company, 3366 Beekman Street, Cincinnati 23, Ohio.

#### THE CINCINNATI

#### GILBERT

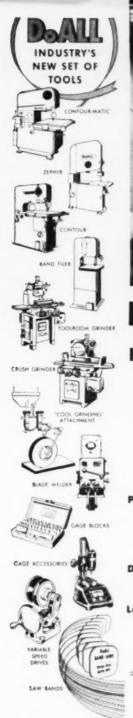
MACHINE TOOL COMPANY

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ACCESSORIES

THOSE WHO BUY GILBERT BUY GILBERT AGAIN





#### IMPOSSIBL

#### It's EASY with a DOALL SURFACE GRINDER!

Problem: Grind a chuck-load of gage block blanks, flat and parallel to .0001" leaving .0001" for lapping. Surface finish must be .000007" RMS or better.

Solution: Use any DoALL Precision Surface Grinder, with "Cool Grinding."

Precision Grinding is one of the first steps in the production of DoALL Gage Blocks. DoALL Grinders have inherent rigidity, plus a fine spindle and smooth operation that make it possible to finish grind with cuts as deep as .025".

DoALL "Cool Grinding" adds to wheel life and prevents burning of the work.

Let us show you, through actual demonstration. how DoALL Surface Grinders can save you time and money. Write for complete information today.













#### Standardized BOSTON 20° **Pressure Angle GEARS** from stock

SAVE 20% of your \$ per HP 20" Boston Gears of the same pitch average 20% lower cost per horsepower delivered than 1412"



#### SAVE 20% in space

20" Boston Gears of finer pitch may be used for equal work - average space saving 20%

SAVE 20% in purchase price 20" Boston Gears of finer pitch may be used for equal work - average cost saving 20%

Average increase in HP per lb. of gear weight - 25% when you standardize on Boston 20° Gears



Design Standardized BOSTON 20 Gearsinto your equipment. Consult Boston Gear Catalog No. 55. Free copy mailed on

Boston Spur Gears cut 20° Pressure Angle are stocked in 12-10-8-6 and 5 pitch. All Boston Steel Miter Gears are now stocked in 20" Pressure Angle.

80 Authorized Boston Gear Distributors—BOSTON Gear Stocks are Near!



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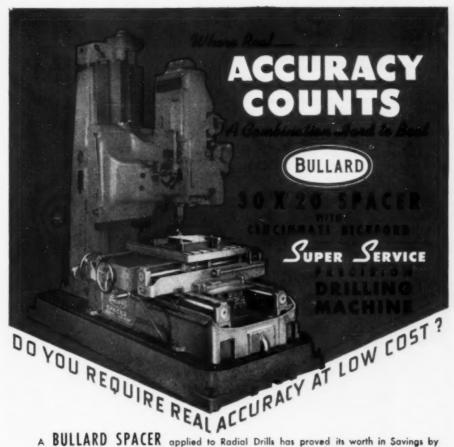












A BULLARD SPACER applied to Radial Drills has proved its worth in Savings by eliminating many costly jigs previously required on many drilling operations.

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However, Accuracy is only as good as the accuracy of the Drill to which the Spacer is applied. To assure the Accuracy of which the spacer is capable, Cincinnati Bickford offer their Super Service Precision Drilling Machine.

With a Precision Spindle in the drill, this combination is Hard to beat on reproduced Accuracy of hole spacing, drilling, reaming and tapping.

Installations of this type are proving Profitable investments in numerous plants. Ash Bullard or Cincinnati Bichford about this "Natural" combination.

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#### SOUTH BEND 10" Precision Lathes

The 10" Swing, 1-inch Collet Capacity South Bend Precision Lathe is engineered for the most exacting close-tolerance machine work. The direct belt drive to the carefully balanced spindle assembly provides smooth, vibration-free speeds up to 1357 r.p.m. Slow speeds for heavy cuts on large diameters are driven through back-gears. Full quick change gear equipment makes any of 48 different threads and 48 different feeds instantly available.

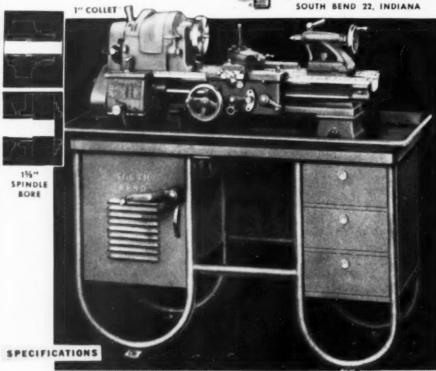
The precision, speed, and versatility of this lathe assures an efficient output on toolroom or man-

ufacturing jobs. The 1-3/8" bore through the headstock spindle makes it especially suited for machining parts from bar or tube stock. A complete line of practical attachments greatly simplifies tooling the lathe for a wide variety of operations. Write for information on South Bend 10" Lathes, Precision and Economy Model Drill Presses, and 7" Bench Shapers.



#### SOUTH BEND LATHE

Building Better Tools Since 1906 SOUTH BEND 22, INDIANA



Catalog No. CL187YB South Bend 10"-1" Collet capacity Quick Change Gear Precision Bench Lathe.

SWINGS: 1014" over bed and saddle wings, 5 %" over saddle cross alide.

BED LENGTHS . . . 3, 31/4, 4 and 41/2 feet

COLLET CAPACITY . . . 1 inch

CENTER DISTANCE . . . 14% to 34% inches
SPINDLE BORE . . . 1% inches

12 SPINDLE SPEEDS . . . 50 to 1357 r.p.m.

CRO'S SLIDE TRAVEL . . 5%"

.0006" to .0309"

THREAD CUTTING: 48 R.H. or L.H. pitches, 4 to 224 per inch

# Now available for oil hardening in entire range of thicknesses . . .

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For templates, cutting tools, gages, machine parts, and many similar pieces.

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 Usually only in larger, more expensive models do you find the combination of speeds, swing tenters, power, feeds and threads that are standard equipment on Rockford Economy Lather. These features make it possible to machine a wider range of work with fewer non-productive hours than is possible with many machines in its class.

That is why we say it's the best lathe value on the market today. It is medium-sized and economy-priced, but it's built to handle any job that can be turned or threaded within 16½° or 18½° swing, 30° full or 35° maximum overhanging centers. 3100 lbs. of weight, 6' bed and zero precision bearings give it the rigidity and precision for turning out tool room accuracy. Doesn't that sound right for more production in your shop?

A Rockford representative will give you full details on these machines and we will gladly send our new bulletin No. 900°C on request.

MEDIUM-SIZED ECONOMY-PRICED

ROCKFORD ECONOMY LATHES-16" and 18"

ROCKFORD MACHINE TOOL CO. . ROCKFORD, ILLINOIS

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WATER-TIGHT CONDUIT BOX Protects against drip,



CORROSIVE RESISTANT CAST IRON FRAME More solid, more rugged



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#### "DELCO PREFERRED"

-because Delco Delivers

Open and enclosed motors for most industrial applications in sizes up to 100 horsepower for standard foot mountings. NEMA C & D flange-mounted motors available in sizes through 30 horsepower. Get in touch with Delco Products, Dayton, Ohio . . . or any sales office listed below.



DYNAMICALLY BALANCED ROTOR AND SHAFT ASSEMBLY Reduces vibration, wear



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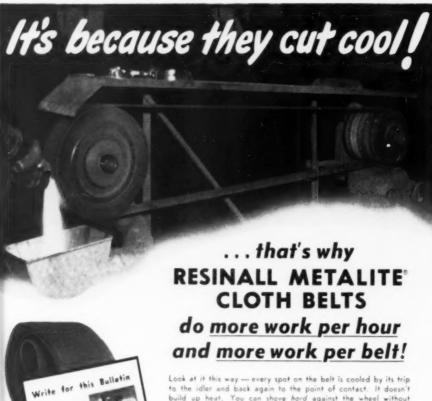


#### DELCO MOTORS

**DELCO PRODUCTS** 

Division of General Motors Corporation, Dayton, Ohio

SALES OFFICES: Chicago . Cincinnati . Cleveland . Dallas . Detroit . Hartford . Philadelphia . St. Louis ALSO AVAILABLE THROUGH UNITED MOTORS SERVICE BRANCHES



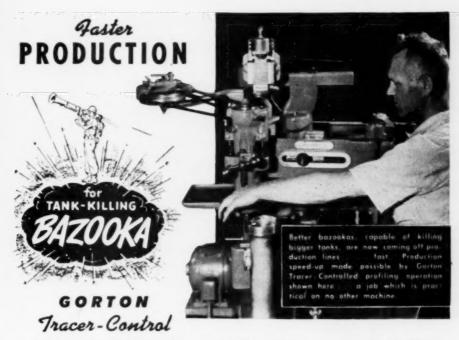
Look at it this way - every spot on the belt is cooled by its trip to the idler and back again to the point of contact. It doesn't build up heat. You can shave hard against the wheel without burning the work. You remove stock faster with RESINALL

Another point - the resin bond. Grinding heat doesn't soften it. The abrasive grains are held rigidly in their original cutting position, like a lathe tool in a good tool holder. No laying away from the work, no rubbing, no excess, useless friction. It's all cutting - with RESINALL METALITE Belts.

Sustained cutting, too - not only because of the extreme hardness of the aluminum oxide grains, but because the heatimmune bond doesn't get tacky and pick up chips. This belt resists loading all through its long life.

All this is worth proving for your own profit. A BEHR-MANNING Field Engineer will gladly run a test on your work, either in your shop or our nearest Demonstration Room. Write us today. Address Dept. MMS-2.





# SPEEDS PRODUCTION CUTS COSTS

On many all-but-impossible jobs, Gorton Tracer-Controlled Pantographs and Duplicators speed up production on military or industrial contracts. High surface finish results from spindle speeds up to 45,000 R.P.M. Accuracy results from the use of over-size masters, patterns, or templates together with the reduction ratio which is exclusively characteristic of the pantograph. Whether a dozen or a thousand pieces, each is identical to the first. Work piece size varies from instrument parts to areas of 10 to 20 feet.

Gorton tracer-controlled equipment quickly pays for itself in profiling, routing, die sinking, mold cutting, counterboring, chamfering, grooving, graduating, engraving as well as many other standard or special operations on ferrous or non-ferrous metals and plastics where work is flat, uniformly curved, cylindrical, spherical or irregular in shape.

Mail the coupon below for General Catalog illustrating the complete Gorton line.

# PRODUCTION DATA-

JOB: Profile 6 locking lugs for male and female sections of new 3.5" Bazooka MATERIAL: Aluminum alloy

CUTTER: 5/32" dia. single flute, fast spiral H.S. steel running at 3,900 R.P.M., without coolant

MASTER: 2 masters; one for male and one for female sections; 3 times aversize, traced manually

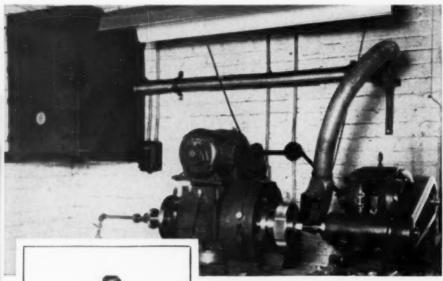
HOLDING FIXTURE: Pneumatic-operated internal expanding type

APPROX. TIME: 36 pieces per hour

ALTERNATE METHODS: None practical



Please send at once complete infort the Gorton line contained in Bulleti	
Firm	
Name	
Title	
Address	
City State	





# Torit **Dust Separators**

Torit also manufactures a line of excluse type dust separators, in sizes ranging up to 5 H. P. Many are designed for indiose recirculation of the filtered air. Above is a Twin Cyclone unit that delivers 2100 c.f.m., velocity 6,000 ft. per min, static pressure, 3".

I'll be hanged . . .

# if you can't do a better job with **Torit Dust Collectors**

Torit Dust Collectors are self-contained units for capturing and cleaning dust laden air from around grinding, polishing, and other dust creating machines. Compactly designed, they are easy to fit into present and future production layouts, for they will go most anywhere.

In the installation above, a Torit Dust Collector is hung from wall brackets. Others have been hung from ceilings, placed under the machine, or tucked in odd corners wherever a bit of space is available.

This compactness means efficiency. Torit Dust Collectors can be set close to machines, minimizing pipeline losses. They can be wired through the some starting switch to eliminate idle running and, as they recirculate the air after cleaning, no room heat is lost.

For details and latest Torit catalog, write:



Manufacturing Co. 296 Walnut St. . St. Paul 2, Minn.

This marine Diesel engine connecting rod is now roughed and finished from the rough forging in exactly 2 hours. It formerly required  $9\frac{1}{2}$  hours to do the same job.

With production costs constantly reaching new peaks, industry simply can't afford to ignore such savings from modern equipment. Where else could such a magnificent return upon an investment be secured, and how else can costs be lowered to meet an increasingly competitive market?

More production per man hour is the answer and the only answer to prohibitive costs—modern, high production machinery is the answer to greater production per man hour.

The astounding saving on this connecting rod job is the result of transferring it from previous equipment to a new 32-inch "AMERICAN" Hydraulic Duplicating Lathe. Such savings as this are not the exception but the rule when "AMERICAN" Duplicators are put on the job.

Bulletin No. 35 shows many such examples—it's yours for the asking.

THE AMERICAN TOOL WORKS CO.

Cincinnati, Ohio U.S.A.



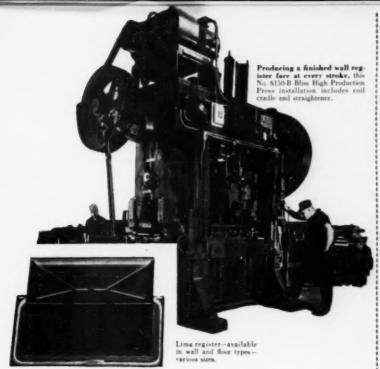
• Designed around sound engineering principles and produced by modern methods on up-to-the-minute equipment Sidney Lathes offer many cost saving advantages on all types of turning operations.

Rigidity is maintained by the four wall bed construction with double cross girts at close intervals. Anti-friction bearings throughout the headstock, end gear train, gear box, apron and all parts carrying radial or thrust loads, the smooth, silent power of the herringbone geared head all contribute to precision performance over long periods

> Make your next lathe a Sidney. Consult a nearby representative for details.



SIDNEY MACHINE TOOL COMPANY - SIDNEY, OHIO



# 5 Bliss Automatic Presses at Lima Register Co. equal output of <u>65</u> hand-fed

COST OF VALVE IS 1/25th THAT OF HAND-FED PART

It's a fact! In choosing equipment and methods to produce stampings for the famous Lima Register, Bliss and Lima engineers agreed that 5 Bliss presses set up for automatic operation would equal the output of 65 hand-fed presses.

Now, 18 months later, the plant is in full production and the 5 Bliss presses are turning out all the stampings required.

Two Bliss High Production Presses with progressive dies and Bliss coil cradles handle the bulk of the production. Stamping runs of 15,000 or more are assigned to these presses. Bliss Inclinable Presses with roll feeds are exactly suited for the production of a variety of small-lot stampings.

An example of the unusual savings achieved by Lima is the floor register valve. Formed complete—80 a minute—in a Bliss No. 675 High Production Press, it costs only 1/25th of a hand-fed stamping.

Similarly, high savings are obtained on all stampings produced on Bliss automatic presses.

If your stamping runs are 50,000 or more ask Bliss engineers how High Production Presses can increase your profits. Your nearest Bliss representative will be glad to talk about converting your hand-fed stampings to automatic operation.

E. W. BLISS COMPANY, CANTON, O.



Valve for floor register...80 per minute...20 gauge steel...675 Bliss High Production Press.



Bidy slide...80 per minute...20 gauge steel...675 Blins High Production Press.



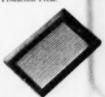
Short border...75 per minite... 16 gauge steel...6150 Bliss High Production Press.



Sliding channel...100 a minute ...20 gauge steel...675 Bliss High Production Press.



Hinge angle...100 a minute...20 gauge steel...675 Bliss High Production Press.



Cold air face...40 a minute... blanked on 6150 Bliss High Production Press; formed on 211/9 Bliss Inclinable Press.



Chain clip...100 a minute...24 gauge steed...Blies 21-B Inclinable Press.



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Built in No. 2 and No. 3 Sizes

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> jobs requiring higher or lower speeds, which is a necessity today with ever-changing design. Where power feed is desired four rates of feed are furnished.

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# 40¢ per day unit cost pays off for Modern Tool & Die, Cleveland

"We know the Dumore Power-Flex is a paying investment", says Erwin Gerhard, V. P. and Supt. of Modern Tool & Die Co., Cleveland. "We use these units for grinding, polishing and buffing. We also have air tools, but it's easier to plug the Power-Flex into any convenient socket than to fool with air pressure connections."

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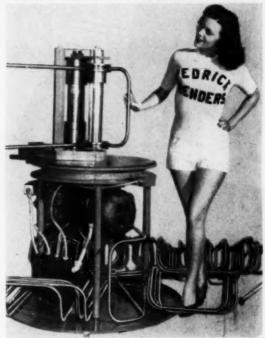
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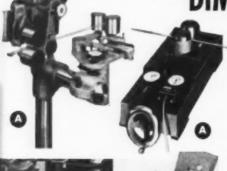
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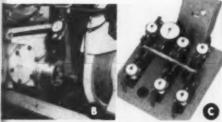
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furnished with Standard Tooth (regular or wavy set) . . . and Skip Tooth for cutting plastics, wood, aluminum, and other soft materials. All widths are now packed in handy 100' containers. ... or welded to and in coils of 300' exact machine-length. Get delivery from stock from your local Simonds Distributor . . . call him today.



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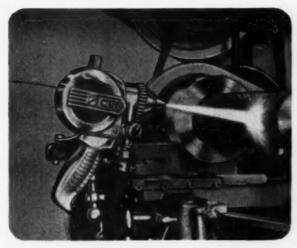
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# <u>now</u> a really low-cost metallizing installation

with the new Metco L-Gun





ilding up worn broke-drum



etallizing protective coating on steel plate

METALLIZING ENGINEERIN

New, low, compressed-air requirements . . . only 10 cfm at 40 to 60 psl, already available in many shops, or supplied by inexpensive 3 hp compressor . . . bring metallizing within reach of the small user.

nance shop to get into profitable metallizing operations like these:

- Save up to 90% of replacement costs on machine repair jobs,
- Do your own hard-facing.
- Apply long-wearing corrosion-resistant coatings to exterior plant structures, tanks and other equipment.

Sprays 23 Different Metallising Wires -With the new L-Gun you can spray .10, 25, 80 carbon steels, stainless; babbitts, brass, bronze, nickel, aluminum, tin, zinc, special hard-facing materials such as Metco-Weld H, and the new selfbonding Sprabond wire

It's Versetile - Use the L-Gun machinemounted or hand-held-it weighs only 4 lb. 2 oz. Do all kinds of metallizing work - shaft and bore build-up with harder, longer wearing metals; build up worn pump plungers, crankshafts, motor shafts; apply corrosion-resistant coatings. There are hundreds of different jobs that are "naturals" for metallizing.

Same High Quality as Other Metre Guns-The low air requirements of the new L-Gun have been achieved without any

Here's a chance for the smaller mainte- sacrifice in Metco quality. It embodies new developments in turbine and nozzle construction - is built, like all Metco guns, for rugged, dependable service.

> A Real Opportunity for the Smaller Shap-Thousands of large, well-known companies have been metallizing users for many years, not only in maintenance but in production applications on original equipment. Now, with the development of the new L-Gun, and a low cost installation, metallizing is within the reach of even the smallest plant. (We'll be glad to send you the names of some Metco users-large and small.)

> Free Bullstin or Shop Demonstration-Send off the coupon for the detailed information Bulletin 55 gives you. Or, better still, ask for a demonstration in your own shop by a Mesco Field Engineer. He'll be glad to show you how the new Metco L-Gun works on some job of your own. No obligation, of course



730	following	mames	are	the	propert	y of	Meta	dlizing	Engineering	Co., Inc.
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Gun Bulletin 55; nonstration in my shop:
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# Ames HARDNESS TESTERS are on the job everywhere!

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Testing strip steel before fabricating an important operation that insures against defective materials. You'll find Ames Portable Hardness Testers being used in warehouses, machine shops, schools, on the production line, and in the field — where occurate, an the spot, time-saving hardness tests have to be made. No specimens to be cut off — no waiting for laboratory tests — because Ames Testers are light in weight and are carried to the work.

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AMES PRECISION MACHINE WORKS

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Since 1905 engineers and manufacturers of high-quality special cutting tools for the metal-working industry



FLAT FORM TOOLS

Custom-engineered to meet the precision and production requirements of industry

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# INDUSTRIAL SPEED-UP

demands these POWER-DRIVEN

**PRODUCTION** 

Now, more than ever, speed in production is the order of the day . . . That's why these popular D.P.S. power-driven machines prove a greater than ever contribution to present day industrial needs.



### NUT DRIVER

revolutionary new machine that drives nuts with amazing speed, either semi automatically, or it can be adapted to full automatic operation entirely eliminating the manual handling of nuts. Capacity: nuts. 3/4" min. to 11/4" max. across flats.



# POWER SCREWDRIVER Model A



Detroit Power Screwdrivers are hopperfed and furnished in three models to drive from No. 2 to % cap screws. Will drive all types of screws, as fast as one a

second . driven to uniform tension . Will not strip threads or mar heads. Great time and labor-saving ma chines that boost production as semblingandbring labor costs down.





Motorized-Highly Adaptable-A selective feeding device whereby production parts are selected, priented and fed in a given position for primary and secundary operations.

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# DETROIT POWER SCREWDRIVER CO. 2807 WEST FORT ST., DETROIT 16, MICHIGAN Yes, send along your new catalog sounds interesting. COMPANY NAME



FOR PRODUCTION ESTIMATE

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Yours very truly, THE GAIRING TOOL COMPANY

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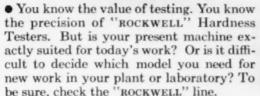
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**ACCESSORIES** "Brale" diamond penetrator • Test Blocks for checking accuracy • Equitron for positioning test samples • Gooseneck Adapter for testing inner surfaces • Work Supports for rods, tubes, odd shapes.

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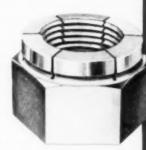


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FLEXLOCs offer these features: one-piece, all metal construction — nothing to work loose or forget, no serious temperature problems; resilient, automatic locking sections, processed by our patented method to provide FLEXLOC's closely controlled torques; and ample, positive resistance to the most chaltering vibration, even after many applications.

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FLEXIOC Self-Locking Nut, "regular" type.



FLEXLOC Self-Locking



FLEXLOC Self-Locking Nut, external wrenching type.

CDC STANDARD PRESSED STEEL CO.

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# Production Pointers

from

# GISHOLT



CUTTING IDEAS



# Gisholt-A Unique Service in the Machine Tool Industry

Here you obtain unbiased help on your turning problems, because Gisholt's broader range of equipment includes both manually operated turret lathes and automatic lathes. Gisholt's recommendations are made without prejudice for one type of machine over another.

# 9888 BEARING CAPS... CHEAPER BY THE HALF-DOZEN SIZES

# on a No. 12 Hydraulic

Smart engineers put on their thinking caps and came up with this better way of producing bearing caps in 6 different sizes, using only one No. 12 Hydraulic Automatic Lathe.

The trick was to get fast machining and fast changeover from one size cap to another-to keep all sizes coming fast! Here's how the job is done!

The caps are held in a 12inch, 3 jaw air chuck with special jaws for locating. The small bore is the most critical and requires the most accurately held dimension. Rough and finish cuts are made independently of each other and without interference from other tooling. Following these, two additional counterbores are finished.

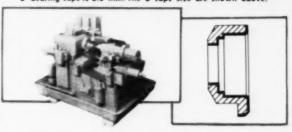
Then, the OD of the lugs is turned, and the open side of the head is faced and chamfered. Time for the entire job on the 3-inch cap is a quick 0.8 minutes! Speed on the other caps, which range up to 6 inches, is equally fast.

### Rapid Changeover

The quick, simple changeover of the No. 12 Hydraulic is an important feature for continuous high-volume production of all 6 sizes of the cast-iron bearing caps. The machine is equipped



On this No. 12 Hydraulic the floor-to-floor time for machining 3" bearing caps is 0.8 min. The 6 caps size are shown above.



The compact Gisholt No. 12 Hydraulic Autometic Lathe, such as used on this job, features simplicity of tooling and rapid changeover.

with a variable speed motor drive, providing a variation in spindle speeds of from 185 to 380 r.p.m., so that the most efficient cutting speed for each part

setting a cheostat. No changing of drive pulleys or speed gears is needed. Well-planned tooling and accessible machine adjustment further add to the speed is instantly obtained by merely and ease of changeover.

# GEAR PRODUCTION DOUBLED BY DOUBLING CUTS

# **Both Turrets** of Saddle Type **Turret Lathe Used** to Maximum

Take the best in turret lathes . . . add a well-planned tool set-up and you're all set to topple high job-time and costs.

That's what this manufacturer did in the machining of bull gears. The job was given to a Gisholt 3L Saddle Type Turret Lathe with tooling expertly planned to take maximum advantage of both the longitudinal and cross movements of the hexagon turret. Several cuts are made simultaneously at every stage of machining.

# Cross Feeding Hexagon Turret Pays Off

Turret face No. 1 gives two different bores and at the same time a rough turn is made from the square turret. In the 2nd



The set-up that saved! This view shows how both turrets work simultaneously to make time on bull gear job.

turret position three different facing cuts are made simultaneously and the back facing is done by the square turret. The 3rd position provides two bores and two chamfers with the hexagon turret and a finish turn of the O.D. from the square turret.

floor time cut from 28 to 12 min.

Result of this 3L Turret Lathe These 20" bull gears are given the job with smart tooling: floor-to- rush act by a 3L Turret Lathe with expertly planned tooling.

# CROSS HOLE DRILLING ON LATHE SAVES ADDED OPERATION, OPERATOR

Here's Machining and "Hole-in-One"!

pays off big in maximum parts per hour-minimum cost.

The job is machining axle shafts which require end cross holes. Instead of doing only the finishing operations on the lathe. and then moving the shafts to another station and operator for drilling, this manufacturer does the whole job at once.

A small air motor is mounted at the rear of the cross slide on the Gisholt No. 5 Ram Type Lathe. After machining is completed, the drill comes in to drill the cotter keyhole. The drill is guided by a drill jig mounted in the duplex tool holder on the turret station preceding the die head (see photo). Floor-to-floor time is only 4.3 minutes.

operation, operator and in hanhole drilling on the lathe, the or burring is not needed.

This little stunt pays off more die head which follows corrects Here's a production pointer that than in just saving an extra any distortion of the surface and removes the drill-hole burr. Furdling time. By doing the cross- ther inspection, hand scraping

> Tooling and cross-slide mounted drift on the Gishalt Ram Type Lathe for finishing and drilling exte shafts.



### HAVE YOUR "EQUIPMENT REPLACEMENT ANALYSIS" FORMS?

Here's real help in determining when and what old machine tools should be replaced. Gishalt has made up the "Equipment Replacement Analysis" form (as determined by MAPI formula) into a complete 4-page folder with step-by-step instructions. Write for your free capies today!



# FASTERMATIC "MAKES HAY" ON HAY BALER PARTS

Saves 1500 Hours Per Year!

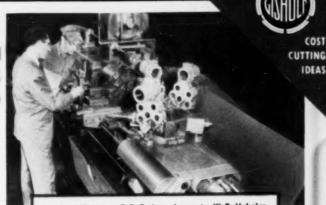
See this sheave? It's a small but vital part of the hay balers built by New Holland Machine Company, New Holland, Pennsylvania.

By cld machining methods, 2

operations and 11.88 minutes were needed to ready the 12½ inch sheaves for the balers. Too slow and costly, New Holland engineers figured. So they looked for a better way of doing the job—and found it: in a Gisbolt 2F Fastermatic Automatic Lathe.

Time Slashed 37%

Now, the entire job is done in



Standards Engineer, C. R. Frain and operator W. R. Habelar go over job. The Fastermatic upped production 63%.

one operation—and floor-tofloor time is cut from 11.88 minutes to only 7.5 minutes. Machining time is only 4.6 minutes. Moreover, the operator is free to handle other machines now because of the completely automatic cycle of the Fastermatic. He is needed only for loading and unloading the machine.

Figured by the year, the time saved by the Fastermatic reaches the impressive total of 1496.5 hours! Mighty important in these days of labor shortages and the need for higher production.

# ROUGH, TOUGH STEEL CASTINGS A SNAP FOR SIMPLIMATIC

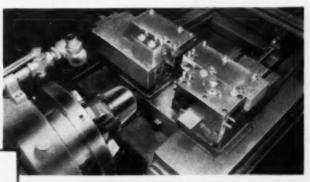
# Lot of Stock Removed

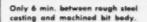
The special talents of the Simplimatic are paying handsome dividends on this job—the machining four sizes of drill hit bodies.

Being steel castings and irregularly shaped, they are not only hard to machine, but also difficult to hold. For a firm grip on the bit bodies, a duplex air chuck is used. This is a 4 jaw chuck with the jaws arranged in two pairs, each operated by its own piston in a duplex air cylinder. The work is therefore centered in two crosswise directions while 4 jaws rigidly hold it during machining operations.

The flat platen of the Simpli-

matic with its independent tool slides permits a compact, effective tooling arrangement with minimum tool overhang. The tooling gives simultaneous machining of a combination of straight and taper-turned diameters, two straight faces, an outside bevel and an internal chamfer. Floor-to-floor time is from 3 to 6 min. for the A.P.I. pin sizes from 3½" to 6¾". A 2nd operation finishes the surfaces, using same machine and tooling.





Simplimatic tooling for machining cost steel drill bit bodies.





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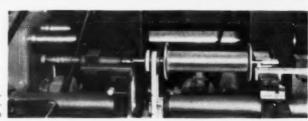
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An enlightening article on balancing and the major role it is playing in the textile industry



was carried in a past issue of Textile Industries. Entitled "Dynamic Balancing of Machinery," it was prepared by a high-ranking authority in the textile industry. Reprints of this article are available by writing Gisholt at Madison.

This Gisholt Dynamic Balancer is used to determine the amount of unbalance in a textile spool. (Photos courtesy Textile Industries.)



This picture shows a variety of spools which are dynamically balanced on Gishalt Machines.

# 

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# Guest Editorial

# Something Worth Remembering By MARION B. FOLSOM

Chairman, Committee for Economic Development and Industry; Member, Advisory Committee on Mobilization Policy

I WOULD like to point out something worth remembering in the days ahead. It is simply this: that the main strength of America is the character of her free people. Our history reveals our love of peace, and that is still our first goal, but it also reveals our willingness to do what has to be done once we understand what is required. We have been learning—the hard way—that peace does not come quick and easy. So, while still hoping for peace, we are also facing up to our problem of military defense. In such characteristics of our free people is our greatest strength.

Our number two source of strength is the American ability to produce. To realize how great this is, we need only recall the production job our people did in the last war. It was an amazing job when you remember that in addition to the great output for war we were also able to produce enough to maintain high living standards.

As for American business—its first responsibility is to increase production, as requested by President Truman.

First, we must produce as fast as possible the equipment the military forces decide

they need for the present and future.

Second, we must at the same time continue to produce as much civilian goods as

we can, so that America's living standards will suffer as little as possible.

These two objectives will be hard to reach. And they won't be reached without great effort and sacrifices by businessmen and other citizens. That they will and can be reached—and faster than may now seem possible—is indicated by the fact that in this country, output per man per hour has more than tripled in the last fifty years. At the same time, our average hourly work week has dropped about one-third.

There's no new super-highway to this increase in production. We must take the same hard road as in the past: first, better training and more efficient use of the skills of our people. Second, rapid improvement of production methods. Third, increase in capital (investment in plant equipment and materials). Fourth, better management leading to more efficiency and less waste.

Unfortunately, a quick shift to war production creates another serious problem—inflation. Here is what happens: more money will be paid out in wages for increased production. Yet, in spite of all we do, there will be less for civilians to buy. In other words, we shall have more people with more money competing for fewer things. How, then, can we drain off this greater purchasing power and put it to useful work?

First, both business concerns and individual citizens will have to pay higher taxes. We should do this willingly and try to pay for our defense effort as we go; not pass the burden on to our children. Second, all of us in this united effort should buy only what we need, and not before we need it. All groups must do all they can to keep the prices of products and services from going up. Third, bankers and businessmen in general must cooperate with our government in its efforts to cut down on purchases made on credit. Fourth, all citizens should support efforts to eliminate unnecessary non-military spending by government—local and state governments as well as federal. Fifth, all of us can render ourselves and the country a great service by increasing our savings as much as we can and by supporting our government's bond drive.

To the extent that all of us join in gaining these objectives, to that extent will inflation be checked while we are increasing our military strength.

In this emergency, therefore, American business people have at least two big jobs ahead: First our job as businessmen of producing more, fast. Second our job as citizens of fighting the inflationary pressures that surround us.

With our productive capacity backed by the character and unity of the American people, I feel confident in saying as a businessman—"We have done it before . . . we can do it again . . . and better."

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# Mochine Shop

FEBRUARY, 1951

Vol. 23, No. 8

# Application of Metal Cutting Research to Shop Practice, Part II By Dr. Max Kronenberg

Of particular interest in this article are the various machining charts which have been devised by the author. These charts provide an excellent means for determining the maximum efficiency of machine tools. Page 100.

### Practical Toolmaking, Part II

By J. Y. Riedel

In this article the author discusses the type of distortion of tool steel which might be caused as a result of heat treatment. A number of the most widely used steels are covered in this discussion. Page 116.

# Electrical Industry Benefits from Use of Band Saws By H. J. Chamberland

Mr. Chamberland cites several examples of the use of band saws in the electrical manufacturing field on short run production items which resulted in unusual savings. Page 148.

### **Tool Refinements Aid Buick Output**

By Herbert Chase

The author tells how a black light unit is used to check carbide bits for cracks and also helps to spot causes of bit failures. Several interesting tool bit grinding setups are also included. Page 162.

### **Progressive Dies and Their Machines**

By C. W. Hinman

Mr. Hinman explains the application of hitch and die feeds to progressive dies in addition to a special type of die which is used for the multiple cutting of parts. Page 172.

### Mirror Finishes on Carbide Tools

By S. W. Lovejoy

The Tool Supervisor of the General Electric Company's West Lynn Works explains the advantages to be gained from the use of mirror-finished carbide tools. Case histories on the use of mirror-finished carbide tools reveal longer tool life and higher production. Page 184.

### Management Looks to Foremen for Leadership By Edmund Mottershead

Industrial management, facing critical manpower shortages and increasing production demands should look toward its foremen for leadership manpower to solve production problems. Mr. Mottershead analyzes the qualities which makes for good leadership. Beginning on page 206, he presents his "Supervisor's Self-Analysis Rating Chart" which should be of interest to every reader of this magazine. Page 198.

# Application of Metal Cutting Research to Shop Practice, Part II

In which the author presents practical methods for determining proper machining feeds and speeds.

> By Dr. MAX KRONENBERG Consulting Engineer, Cincinnati, Ohio

TMT HILE the charts described in last months article are useful In the hands of time study engineers and production planners, a different method is often effective for making

metal cutting research available to the machine opgrator. If the operator is a skilled mechanic it is often possible to attach to his machine a simplified diagram indicating the recommended feeds, speeds, and so on.

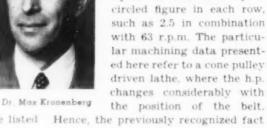
If the operator is not able to read a technical chart, he can be furnished with a tabulation shown (in excerpt) in Fig. 4. On the actual

table, more diameters would be listed than are shown here. Figures above the stepped line refer to the r.p.m. at the top of the table, and those below the stepped line refer to the r.p.m. at the bottom of the table. The figures represent chip cross sectional areas in

1/1000th of a sq. in.; hence 2:5 =0.0025 sq. inch. The operator, however, need not perform any calculations because he can read from a supplementary chart directly the feed

for any depth of cut (as will be seen later).

The most effective combination of chip area and r.p.m. is indicated by a circled figure in each row. such as 2.5 in combination with 63 r.p.m. The particular machining data presented here refer to a cone pulley driven lathe, where the h.p. changes considerably with



Hence, the previously recognized fact that metal removal increases with feed-increase and speed-decrease does not necessarily apply, due to the change in h.p. with the change in speed.

Figure 5 shows the supplementary table for the operator, splitting up the

Chip A	reas	for C	ast I	0	Chip Areas			Steel		
355	250	RPM 180	125	90	Diam.	355	250	RPN 180	125	90
(2.9) 2.6* .9*	(5.9) 1.89 4*	5.64	7.2 3.9		1.0° 1.5 2.1 3.1 7.1 12.0 15.0	(2.9) 2.2 1.2+ 2.0 1.5 1.2 9	2.7 1.5 .9. 3.1 2.3 1.7 1.3 1.0	2.9 1.7 1.04 3.9 3.0 2.2 1.7 1.3	3.4 1.9 1.2 .6 5.5 3.6 4.3 3.1	2.6
63	45	32 RPM	23	16		(63)	45	32 RPM	23	16

Fig. 4—Illustration showing, in excerpt, the type of tabulation which may be made available to the machine operator.

chip area into feed and depth of cut. As an example, a chip area of 2.5/1000th corresponds to a feed of 0.005 in. per revolution and a depth of cut of  $\frac{1}{2}$  in., and so on.

### Service Chart

We come now to the application of metal cutting research to field service. The service chart, Fig. 6, has been found very useful for demonstration of machines and is usually prepared for each individual machine, covering various materials and various tools. Basically, the chart is an extension of the old and simple diagram used for determining the cutting speed from r.p.m. and diameter. Here we have the r.p.m.'s. represented by the 45 degree lines, while the work diameters are plotted at the right hand side and

the cutting speed at the top. To this relationship we have added scales at the bottom of the chart, indicating chip areas which can be used according to h.p. and tool-life for various materials and tools. Furthermore, in order to avoid overloading of the machine, another scale at the left hand side of the chart has been added.

The example refers to the case of machining soft steel of 11 in. diameter. Opposite the 11 in. diameter we find that 0.005 sq. in. would be the maximum chip area which the lathe could stand in this case. Consequently, we trace upward from the 5/1000th value in the soft steel scale at the bottom, until meeting the 11 in. diameter. It will be seen that 21.5 r.p.m. should be used, giving a cutting speed of 62 ft. per min. The feed can again be de-

termined from the supplementary table shown before. As an example, the feed would be 0.020 in. per rev. for  $\frac{1}{4}$  in, depth of cut.

Charts of this type can be included in instruction books, and in sales material in addition to using them in the field service departments.

### Selector Board

Figure 7 represents an example which covers the application of machining research for numerous machines, numerous tools, and numerous materials. It is no longer a chart but rather an instrument which can be placed on the table or mounted on the wall of the industrial planning office or the superintendent's office. The Selector Board for Machine Tools has also been used by sales departments

when discussing the cutting performance of a line of machines, and particularly also for demonstrating production losses caused by obsolete machine tools which are still in operation in many plants.

Four horizontal rows may be seen marked; Lathe No. 1, No. 2, No. 3, and No. 4. Many more such machines can naturally be recorded than are shown here. The speeds of the machines are indicated by small rectangular fields in which the instruction for the position of the levers is indicated (letters, numbers, or symbols). The width of these fields represents an admitted maximum drop in cutting speed that occurs when the desirable r.p.m. cannot exactly be obtained on the machine.

Where the maximum drop is ex-

				Chip	Areas	(1/10	000 aq.	in.)			
	-5	1.0	1.5	2.0	2.5	3.0	4.0	5.0	8.0	10.0	30.0
1/16	.008	<b>.a</b> 16	.024	.032	.040						
व 1/8	,004	.0008	.m.2	.016	.020	•057	•032	.040	.064		
1/8 1/8		,004	.006	.008	.ono	.012	.one	.020	.032	.040	
30/2		-	.003	.004	(005)	.006	<b>.006</b>	.010	.016	.020	.060
3/4						.004	.005	.007	.mı	.m3	.040

Fig. 5—Illustration showing a supplementary table for use by the machine operator in which the chip area has been split into feed and depth of cut.

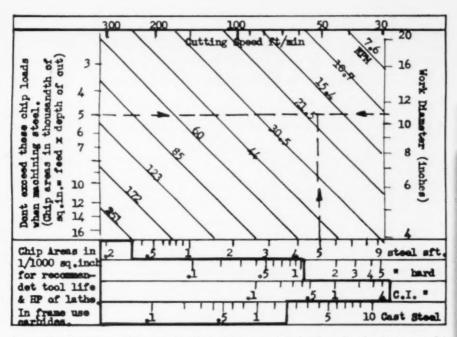


Fig. 6—This illustration shows a service chart of the type which has been found to be very useful in the demonstration of machines.

ceeded—as on many older machines a red field is shown calling attention to the fact that the desired cutting speeds cannot be obtained on the machine within reasonable limits. Lathe No. 2 in Fig. 7 is such an old machine.

The scales shown immediately beneath the Lathe-Section are located on a roll which can be rotated and shifted sidewise and which is mounted behind the board in such a way that only the scales for one material show through a slot in the board.

The use of the selector board is very simple. It is only necessary to shift the roll so that the selected chip area (5/1000th sq. in.) comes under the arrow for the tool (C.C. — Cemented Carbide). Every other related data can then immediately be read. The cutting speed appears under the arrow; it is

only necessary to multiply the diameter (20) by ten to obtain the speed (200 ft./min.) correlated to 5/1000 chip area for medium steel and cemented carbides. Simultaneously, the required horsepower is also indicated, namely under the right hand arrow for C.C., showing that a machine of 10 h.p. is needed for this cut.

Additional data are likewise available, particularly the information, which machine is best suited for this job. The vertical line marked "Example" is actually a vertical wire which can be moved parallel to itself. Here it is placed over 3 in. diam. for determining the machine which should be selected for the present job. Lathe No. 2 would not be considered, because the wire cuts across a red field, indicating that the cutting speed cannot

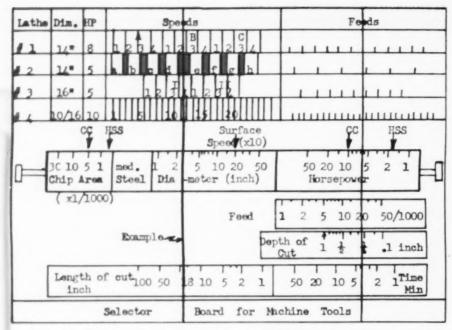


Fig. 7—Illustration of a Selector Board which covers the application of machining research for the requirements of industrial planning offices and sales departments.

be obtained. The best machine would be lathe No. 4; it can deliver the speed and the h.p.

The cutting time can also be determined for any given length of cut and for the feeds which are available on the machine, and which agree with the previously determined speed and h.p. requirements. Placing the arrow of the depth of cut scale opposite the figure "5" (chip area) on the feed scale, permits the reading of all feeds for all depths of cut. It can also readily be checked whether the desired feed is available on the machine by using the right hand vertical wire, Finally, shifting the bottom scale so that the length of cut comes under the left hand wire (18 in.), gives the cutting time (3.9 min) under the right hand wire.

#### Milling of Steel

Considerations which hold for turning operations apply also to other metal cutting operations. It is unnecessary, however, to go into all of the possibilities, therefore only a few examples have been selected for milling and drilling operations.

Figure 8 refers to the face milling of steel of various Brinell Hardness values between 100 and 400, and can be used by time study departments, sales engineers and others. The depth of cut and the Brinell Hardness are indicated in the left hand portion of the chart, the width and the feed rate per h.p. are shown in the right hand portion. The latter value need only be multiplied by the h.p. available at the cutter in order to find the recommend-

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ed feed rate in in. per minute. The example refers to a depth of cut of  $^{1}4$  in., a Brinell Hardness of 150, and a width of cut of 4 inch. The answer is 0.8 in. per min. feed rate. If we have a ten h.p machine the feed rate would be 8 in. per minute.

machines are incorporated in this diagram.

Numerous tests have been run in order to determine, among other data, the load which a twist drill can endure before it breaks. It was found that the permissible feed increases

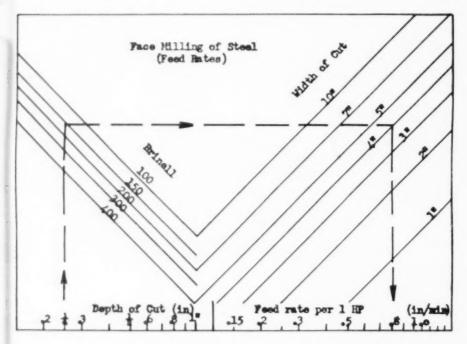


Fig. 8—This illustration shows the type of chart which is designed for use by time study departments, sales engineers, and others.

The number of teeth and other related data can be determined in a similar way.

#### "Christmas Tree" Chart for Drilling Machines

Figure 9 has been prepared to demonstrate the practical application of drilling and drilling machine research. Data from investigations of twist drills as well as data from investigations of power and rigidity of drilling with the 1.5 power of the diameter and would go up, so to speak to infinity, were it not for the machine.

Then, another series of tests have been run to investigate the deflections of drilling machines. It was found that the feed must be reduced inversely proportional to the diameter if the diameter exceeds a certain value.

This is roughly the background of some drilling research presented in a nutshell. The question arises what to

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do with these data, so that the shop, the customer, the sales engineer, and so on, get the benefit of it. The Christmas tree diagram is the answer. It refers to drilling of SAE 1035 on an 8 h.p. machine.

The ascending steps show how the feed can be increased with increasing user, who may employ any desired cutting speed within the capacity of the machine, which is likewise incorporated into the chart.

#### Example:

It is desired to determine the best combination of feed and r.p.m. which will give the shortest production time,

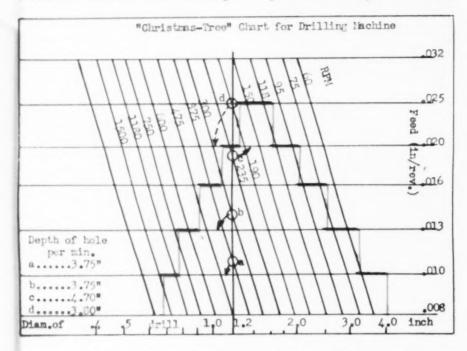


Fig 9—Illustration showing the type of chart which has been prepared to demonstrate the practical application of drilling and drilling machine research.

diameter of the hole; the descending steps show how the feed must be reduced for large diameters if the deflection of the machine shall be kept within admissible limits.

The zone inside the orange lines contains the feeds which may safely be selected from the point of view of strength of the drill and of the machine. The selection of cutting speed and r.p.m. is at the discretion of the for drilling a hole of 1.2 in. diameter. Following the vertical line passing through 1.2 in. diameter upward, it will be seen that the oblique r.p.m.-lines are intersected at points a, b, and c within the safety zone and at point "d" outside the zone. At point "a" we have 375 r.p.m. The nearest feed to this intersection point is 0.010 in. per revolution. The depth of hole per 1 min. is accordingly 3.75 min. as shown

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in the left hand table in Fig. 9. At point "b" we have 300 r.p.m. and 0.013 feed, corresponding likewise to a production of 3.75 in. per minute.

It will be seen from the left hand table, that point "c" gives the greatest depth of hole per min. and is therefore the preferred value. To select the combination indicated by point "d," would require a reduction of the feed (due to overstressing the twist drill) and consequently reduce the depth of hole per minute.

The high capacity of the machine will not be fully utilized unless the points are actually located on the feed lines. The machine is somewhat overloaded if the nearest larger feed is selected and underloaded when the nearest smaller feed is taken.

Underloading and underproduction can be avoided by reducing the increments in the feeds, that is, by redesigning the feed box of this machine. As an example the depth of hole for point "b" could be increased to 4.06 in, per min, if a feed of 0.014 in, per rev. would be available on the machine. Under certain circumstances it may be advisable to use one of the combinations which do not give quite the maximum depth of hole, but which give a better surface finish and tool life when the feed is reduced and the speed increased. This type of diagram is useful for time study departments, designers, operators and field service men.

#### **Future Development**

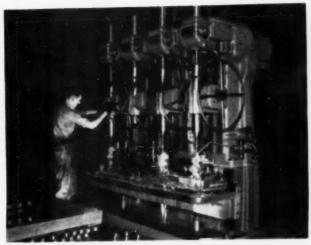
Metal cutting research also permits certain conclusions to be drawn with regard to the development of machine tools. These conclusions may be summed up in the following manner: It is more advantageous to utilize the high h.p. capacities of machine tools by combining high cutting speeds with low forces rather than by using the reversed combination, except in cases of roughing sturdy workpieces. The development of machine tools to be designed for application of sintered carbide tools will therefore follow the same trend as that found in other branches of engineering, such as aircraft, namely high speeds, low forces and light weight, thus reducing deflections and improving surface quality. More research should be devoted to vibration problems in machine tools because the rigidity of the machine will affect its performance. Critical speed ranges occur, causing resonance with the natural frequencies of some machine member at these high speeds.

#### War Production

The critical world situation we are facing today has once again caused attention to be focussed on our supply of tungsten. Prior to the present "acts of armed aggression" this material for cemented carbide tools was imported to a considerable extent from China and Korea. The Chinese are now shipping most of their production to Russia, thus rendering it that much more difficult for American manufacturers to produce the urgently needed implements of war. We can and must, therefore, overcome any shortage of tungsten which might result by applying American "Know How" and ingenuity to machining problems and high on list of this "Know How" is the application of metal cutting research to shop practice.

The foregoing information was prepared by the author and delivered in the form of a talk before a recent meeting of the Cincinnati Chapter, American Society of Tool Engineers.

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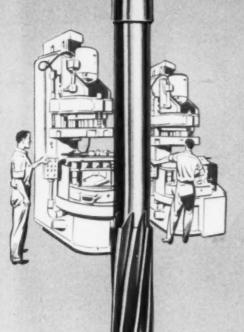


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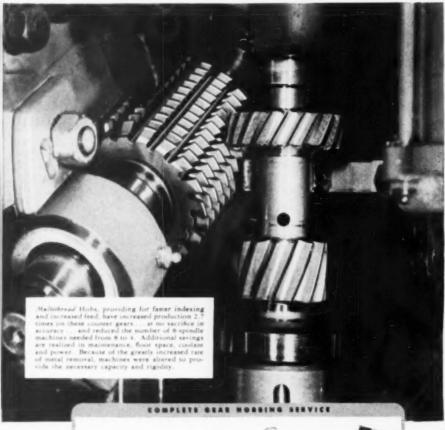
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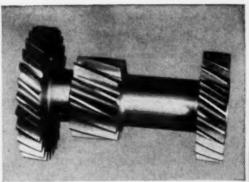




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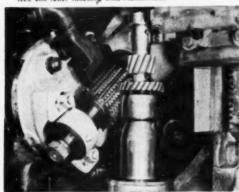
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steel. Multithread hobs have cut costs per gear to slightly
over 1/3 former average. Lead errors are held within .0005".
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## Practical Toolmaking, Part II

In this article the author discusses distortion of tool steel in heat treatment.

By J. Y. RIEDEL

Tool Steel Engineer, Bethlehem Steel Co., Bethlehem, Pa.

THE term distortion, as applied to tool steel, is used to describe a change in the shape or the size of a tool as a result of heat treatment operations used to harden the tool. Distortion may be considered as being made up of two components, namely, (1) Warpage, which is change in shape with no change in volume of the tool, and (2) Growth or (shrinkage), which is an increase (or decrease) of external dimensions resulting from the volume changes which occur as a result of the hardening operation.

The warpage factor is usually associated with the geometrical shape of the tools and with thermal stresses produced by non-uniformity of heating or cooling operations. It is practically independent of the composition of the steels used for tool steel purposes.

Growth (or shrinkage), which occurs as a result of volume changes resulting from the hardening operation, is often called inherent distortion. The inherent distortion is a characteristic of each grade or composition of steel and varies considerably with the composition. The inherent distortion is a constant factor only when the heat treatment operations are specifically defined; variations in heat treatment can produce enormous variations in so-called inherent distortion of a given grade of steel.

Following are some typical approximate inherent distortion "factors" which are commonly used in connection with hardening of tool steel:

a. Carbon tool steel—0.002 in./0.004 in. per inch (plus).

b. An oil hardening steel—0.0015 in. per inch (plus).

c. Air hardening steel (5 per cent Cr)—0.001 in. per inch (plus)

d. High-carbon high-chromium steel—0.0005 in. per inch (plus or minus).

These "factors" cannot ordinarily be used to predict distortion with any degree of accuracy, except in spherical objects, because of the fact that the geometry and size of the test specimens used to develop these "factors" influence the results obtained. A more precise method of studying inherent distortion characteristics is to measure specific gravity, as pointed out by Scott,\* before and after the hardening operations. From this data, changes in volume in going from the annealed to the hardened state can be calculated. Typical data of this type is shown in Table I.

While the data in Table I is more exact than the "factors," it still does not provide information which will be of practical aid in predicting distortion of tools in heat treatment, except under specific conditions.

Before attempting to explain how to predict the distortion which may be expected to occur in a given tool, it is necessary to become familiar with five fundamental facts concerning the nature of tool steel:

1. Steels expand when heated; they \*Howard Scott, "Dimensional Changes Accompanying the Phenomena of Tempering and Aging Tool Steels," Transactions, American Society for Steel Treating, Vol. 9, 1926, Page contract when cooled. This fact is true under all circumstances, except when steels are being heated through their "critical ranges," when the reverse is true.

2. Cold steel is strong; hot steel is weak. It is, therefore, obvious that during liquid quenching operations, where great temperature differentials occur, the cold steel will stay "put," while the hot steel will deform in response to stresses set up by the temperature differentials. The resulting deformation is often called warpage. or is sometimes called "hot upsetting."

3. Martensite (which is the name given to the hard product produced by quenching steel) occupies a greater volume than the annealed steel from which it came. In other words, the hardening of tool steel normally tends to produce expansion.

4. Austenite (which is the name given to the high temperature phase

Table I

Grade of Steel	Size of Specimen	Specific Gravity, Annealed	Hardening Treatment	Specific Gravity, Hardened	Per cent Volume Change in Hardening
Carbon Tool Steel	% in. dia. x 1 % in.	7.865	1450 deg. F., brine	7.795	+0.9
Carbon Tool Steel	11/e in. dia. x 3 in.	7.835	1450 deg. F., brine	7.800	
Carbon Tool Steel	1/2 in. wafer cut from center of 1 1/2 in. dia. x 3 in. piece after hardening	7.855	1450 deg. F., brine	7.835	+0.3
Mn Oil Hardening	1/2 in. sq. x 1 in.	7.853	1475 deg. F., oil	7.805	+0.6
SiMn Shock Resisting	½ in. sq. x l in.	7.770	1625 deg. F., oil	7.725	+0.6
Air Hardening (5 per cent Cr)	1/2 in. sq. x l in.	7.815	1775 deg. F., air	7.795	+0.3
High-Carbon High-Chromium	1/2 in. sq. x l in.	7.710	1850 deg. F., air	7.715	+0.1

Volume Changes in Hardening Tool Steel

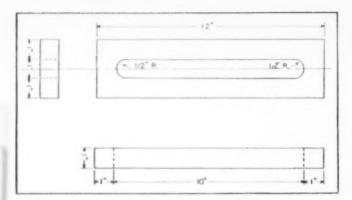


Fig. 1 — Drawing of Test Piece Developed by A. W. Barndt of Heintz Mfg. Company

considered by dividing the tool steel grades into groups, classified by the hardening.

of steels, after heating for the quench, but before the quench has started) occupies a smaller volume at room temperature than the annealed steel from which it came. Since it is possible under some conditions to retain austenite in quenched tools, it is apparent that this situation will tend to oppose the expansion which always occurs when martensite is formed.

5. Some types of tool steel are shallow hardening, that is, they harden fully only in the outer layers; the inner portions do not transform to martensite during hardening and thus are considered as being "unhardened." The term shallow hardening is a relative term, as the size of the section involved determines whether a given steel will harden through or not.

In order to understand how the foregoing facts may be of value in predicting distortion, it is necessary to appreciate the fact that distortion is the sum total of the effects of warpage plus the effects of inherent distortion. If these two effects are additive, a large amount of distortion will be noted; if they tend to cancel, the amount of distortion may be negligible. The relative effects of warpage versus inherent distortion may best be

#### Water Quenching Steels

The data in Table I indicate that water-hardening carbon tool steel expands considerably during hardening, as a result of inherent distortion, if the section is small enough so that through hardening occurs. (0.9 per cent volume change corresponds to 0.003 in. per inch length change). When the section is large enough to be shallow hardening, the expansion is considerably less, and is in the range of the value shown for oil hardening steels. Since most applications of carbon steel involve sizes which do not harden through, it may be logically asked why tools made of this steel distort so much more than other steels. The answer to this question is that inherent distortion plays only a minor part in the distortion of water hardening carbon tool steel; the major part is played by warpage (hot upsetting, or the action of cold steel upon hot steel). Warpage is large because of the large temperature gradients in tools during water quenching. The warpage factor is, to a large degree, controlled by the size and shape of the tool since the geometry of the tool determines which portions will cool first

in a quench and which will cool last.

It is a recognized fact that steels such as carbon tool steel, which require water quenching for hardening, are notoriously treacherous with respect to distortion. If a number of identical tools are made up from carbon tool steel and are heat treated exactly alike, it will be found that, after hardening, each tool is of different size and shape. This is due to the non-uniformity of cooling in the quench because of vapor pockets which form on the surface of the tool during quenching. Thus, there is a variation in the warpage factor on each tool.

Unfortunately, no method exists for evaluating the warpage factor. We are, therefore, unable to predict the distortion of water hardening carbon tool steel except in a general way on the basis of previous experience with tools of similar size and shape.

As an example of the unpredictability of distortion of water hardening carbon tool steel, consider the die shown in Fig. 1. If a die of this type is made up from carbon tool steel, it will be found that the dimensional changes resulting from hardening are

less than 0.001 in.
per inch except on
the thickness,
which is better
than the results
which can be obtained from most
air hardening
tool steels. The

explanation of this result must be that the distorting tendency resulting from warpage counterbalances the inherent distortion and the volume change resulting from the hardening operation appears entirely as an increase in the thickness.

#### Air Hardening Steels

Because of the small temperature gradients which exist in most tools during cooling in still air, the warpage factor is practically negligible in air hardening steels. Under these conditions distortion may be quite accurately predicted using only the inherent distortion "factors." However, tools which have considerable variation in section, or tools which are cooled in an air blast, will not cool uniformly, and thus the warpage introduced will affect the distortion of these tools.

#### Oil Hardening Steels

Tools which are oil quenched have temperature gradients which are larger than those present in air quenched tools but which are not nearly as large as those present in water

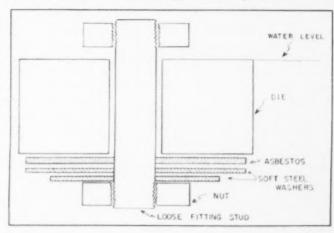


Fig. 2 — Sectional View of Apparatus for Shrinking the Bore of a Ring Die

quenched tools. Oil quenching does not produce vapor pockets, as water quenching does, and, therefore, the size changes which occur in oil quenched steels are reasonably consistent on duplicate tools. Generally, the warpage effects in oil quenched tools are considerably less than the effects of inherent distortion if the section involved hardens completely through. Therefore, inherent distortion "factors" can be used as an approximation of expected distortion of oil quenched steels, although the accuracy of such predictions will not be as good as on air quenched tools. If the tools do not harden through, the use of inherent distortion "factors" will be extremely misleading and distortion cannot be predicted except on the basis of previous experience.

#### Oil Hardening Steels Quenched in Salt

Quenching of tools in molten salt (martempering) involves smaller temperature gradients than oil quenching, and thus serves to practically eliminate the warpage factor in the hardening of steels normally hardeneded by oil quenching. Therefore, the distortion of salt quenched tools can be quite accurately predicted by use of inherent distortion "factors." The application of the five fundamental facts will now be considered with regard to tools of different shapes:

1. Cylinders. In the hardening of cylindrical objects of sizes where the diameter and length are both small, it is invariably found that both the length and diameter expand as a result of the hardening operation simply because of comparatively uniform martensite formation.

In a shallow hardening steel, if a

cylindrical part of length considerably greater than the diameter is hardened by vertical quenching (as it always should be), it is practically always found that the diameter increases, but the length contracts. The reason for this will be apparent if the hardening operation is visualized as follows:

a. As the first portion of the cylinder is hardened, the end face and the circumference tend to expand.

b. As additional sections of the circumference hardens the outer cylindrical surface expands and tries to take the hot interior with it.

c. In order that the hot interior can expand with the outer surface, hot center metal is "sucked in" longitundinally from the as yet unhardened steel, thereby contracting the length considerably before the upper face end can be hardened.

In view of the actions described in the preceding two paragraphs, it should be apparent that there is a certain size of cylinder, for a given grade and set of quenching conditions, which will not change length at all in the hardening operation. When the above conditions are determined, it is universally true that an increase in the length of this cylinder will result in contraction of the length of the cylinder in hardening; conversely, a decrease in the length will result in expansion of the length in hardening. However, when working with a deephardening steel expansion in all directions will usually occur, to a degree indicated by inherent distortion "factors."

2. Long Rectangular Shapes. As an actual example of how shallow versus deep-hardening will effect long tools, consider the hardening of two shear blades about 1 in. x 4 in. x 120.000 in. and 2½ in. x 6 in. x 120.000 in. made

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of a Si-Mn shock-resisting steel. After hardening to C58 Rockwell, it will be found that the 1 in. x 4 in. blade will be about 120.250 in. long while the 2½ in. x 6 in. blade will be 119.875 in. long. The thin blade hardens through, and thus expands in all directions because of martensite formation. The thick blade does not harden through and contracts in length by the mechanism just described for long cylinders.

change in inches per inch is not very close to the linear "factor." However, with each dimension expanding 0.003 to 0.004 inches the "cleaning up" of this die is a simple matter. The variation in these results from those predicted by use of inherent distortion "factors" is a measure of the degree to which the warpage factor has influenced the distortion of the die.

As an example of the errors which can result from misuse of inherent dis-

Table II

	Before Treatment (Annealed)	After Hardening Treatment (*)	Size Increase, Inches	Size Increase, Inches per Inch
Length	5.7688	5.7720	0.0032	0.0006
Width	1.7501	1.7542	0.0041	0.0023
Thickness	1.3760	1.3796	0.0036	0.0026

(\*) 1475 Deg. F., Oil Quench, 400 Deg. F. Temper

Distortion of Mn Oil Hardening Steel Die

3. Short Rectangular Shapes. Generally speaking, short rectangular Bolid dies will expand in all directions as a result of the hardening operation if the section hardens completely through. On air hardening steels, the amount of expansion can be accurately predicted using the inherent distortion "factors." For oil hardening steels, the amount of expansion can be estimated, if too great accuracy is not expected. The example shown in Table II will illustrate this point, having been picked to show the amount of error which may ordinarily be encountered in predicting size changes in oil hardening steels.

The change in volume occurring on this die is .55 per cent, which corresponds to an average linear change of 0.00175 inches per inch. The position may well be taken that the actual tortion "factors," consider the data in Table III, which shows the distortion of a die roughly twice the size of the die in Table II.

The increase in volume occurring in the hardening of this die is .46 per cent. This figure is lower than normally expected for this grade, and indicates that the die did not harden completely through, thus accounting for the shrinkage in length. It is obvious that inherent distortion "factors" cannot help in predicting the distortion on a die of this type.

4. Ring Dies. As a further example of the use of the basic principles outlined, consider the hardening of a ring die. It is common knowledge that a heat treater "shrinks" the bore of ring dies in heat treatment by quenching through the bore. This may seem inconsistent with previous statements.

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wherein it is pointed out that the formation of martensite by quenching always causes expansion. Further consideration will show that this is not inconsistent, since the contraction is actually caused by the expansion due to martensite formation. If the hardening of each segment of a ring is visualized, it can be seen that the ring will expand at the bore surface. However, the net effect of expansion at the bore surface actually results in con-

bore, the hole will enlarge due to the fact that it "goes along" with the rest of die in its expansion due to martensite formation.

Ring dies made of air hardening steels will enlarge in both O.D. and I.D. in amounts calculated from inherent distortion "factors." However, if it is desired to have the bore close in, this can be accomplished by air blast quenching through the bore.

There is another application of the

Table III

	Before Treatment (Annealed)	After Hardening Treatment (*)	Size Change, Inches	Size Change, Inches per Inch
Length	11.5010	11.4890	0.0120	- 0.0010
Width	5.5004	5.5147	0.0143	+ 0.0026
Thickness	2.2506	2.2574	0.0068	+ 0.0030

(\*) Same as in Table II

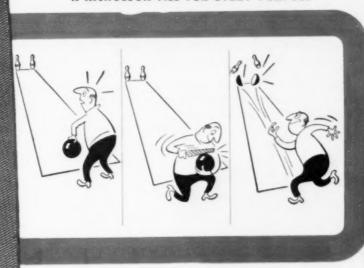
Distortion of Mn Oil Hardening Steel Die

traction of the bore diameter. Another way to visualize this action is to realize that the diametrical expansion of a bar will occur whether the bar is straight or "rolled up" in the shape of a ring.

When a ring die is liquid quenched all over, the O.D. will invariably increase, while the L.D. may move slightly in either direction, depending upon the relative dimensions of the die. If a ring is thin in comparison to wall thickness, the hardening of the faces will control the net distortion due to their relatively greater area presented to the quench. This type of ring will increase in thickness and will usually decrease in O.D. and increase in I.D. If the hole in a die is so small that effective quenching through the hole cannot occur, or if the hole is packed to prevent quenching in the basic principles which is in common use for shrinking the bore of ring dies. The bore of a ring die can be "closed in" about 0.002 to 0.003 in. per inch of bore diameter by this method, which involves: (1) Heating the die uniformly to approximately 1800 deg. F. (2) Quenching the die, on the rim only, to 500 deg. F., while avoiding a quench in the bore. See Fig. 2 for a sketch of the apparatus used in this step. (The center bolt assembly must be water-tight.) (3) Reheating to the proper hardening temperature. (4) Quenching through the bore only, while avoiding a quench on the rim.

The explanation of how this method works is that (a) the quench on the rim causes the metal in this location to contract, thus "hot upsetting" or warping the adjacent hot metal towards the bore; (b) stopping the

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quench at 500 deg. F. does not permit the formation of martensite and thus does not set up any opposition to the contraction forces; and (c) the subsequent quench through the bore further contracts the bore diameter by the inward expansion resulting from martensite formation.

The prediction of distortion is further complicated by other factors, the most important of which are: a. Scaling. In the majority of commercial heat treating equipment, it is found that steels will scale during heating for the quench. The loss of metal due to scaling cannot be ignored since the loss is in the same order of magnitude as the size changes resulting from heat treatment. In some instances, the scaling is an advantage from the distortion viewpoint since it tends to counterbalance expansion

which occurs in hardening. (Of course it will likewise increase the magnitude of shrinkage which might occur). As a matter of fact. the great reputation of the Mn oil-hardening type of tool steel as a n o n - deforming steel is to some degree based upon the fact that the scaling, which occurs in heating for hardening, almost counteracts the expansion which most often occurs during hardening of this grade. Therefore, in the newer type furnaces which are designed to prevent scaling. tool steels may appear to expand more than when treated in older equipment. In addition, the important fact should be rec-



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ognized that salt baths usually do not prevent scaling, although they appear to do so. Actually, scaling occurs but the scale is dissolved by the salt so that it is not visible. However, the short holding time required in salt baths helps to reduce the loss due to scale.

b. Variation in Quenching. Variation of quenching temperature, either above or below the recommended

ened tool steel, would be expected to counteract some of the expansion effect resulting from martensite formation. This effect is actually noted in most tool steels to an appreciable extent.

Table IV shows the amount of volume change produced by a 400 deg. F. temper on some typical steels.

Due to the fact that it is unsafe to measure tools, particularly liquid

Table IV

Grade of Steel	Specific Gravity, Annealed	Specific Gravity, Hardened*	Specific Gravity, Hardened and Tempered	Per cent Volume Change in Hardening	Per cent Volume Change in Hardening and Tempering
Carbon Tool Steel (% in. dia. x 1% in.)	7.865	7.795	7.805	+ 0.9	0.8
Mn Oil Hardening	7.853	7.805	7.818	+ 0.6	+ 0.45
Si Mn Shock Resisting	7.770	7,725	7.730	+ 0.6	+ 0.5
Air Hardening (5 per cent Cr)	7.815	7.795	7.800	+ 0.3	+ 0.2

<sup>\*</sup>Hardening Treatment Given in Table 1

Volume Changes in Tempering Tool Steel at 400 deg F.

range, will usually have a pronounced effect upon distortion. In general, high temperatures tend to promote retention of austenite, which may decrease the expected expansion or increase shrinkage; lower temperatures promote more complete martensite formation with accompanying increase in expansion. Other factors in the quench such as temperature and viscosity of quenching medium, degree of agitation, and so on, will also effect distortion insofar as they may affect the completeness of the autensite-martensite transformation.

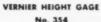
c. Tempering. Fundamentally, the tempering operation causes decomposition of martensite, and, on the hardquenched tools, in the as-quenched condition, the distortion is usually measured only after tempering. The inherent distortion "factors" usually have been corrected for the size changes produced by tempering, and thus can be used directly in predicting size changes from the annealed state to the hardened (quench plus temper) state.

The use of progressively higher tempering temperatures will eventually eliminate the size changes resulting from inherent distortion but at that point the tool will have lost all the hardness produced by quenching and the structure will consist of ferrite and carbide, as in the annealed

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condition. Thus, this method is of no practical value.

d. Measurement of Dimensions. In discussing change of size of tools resulting from hardening, it is a common practice to measure a given dimension at a certain location. However, if a given dimension is measured at a number of locations, variations of appreciable magnitude will be

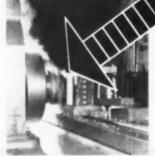
found. For example, holes in dies may become "hour-glass," in shape, or may "belly" in the interior. Thus the recorded diameter of the holes will depend upon where the hole is measured. For the utmost in precision it is necessary to measure all basic dimensions in a number of locations. Measurements of a few dimensions may not give a true picture of distor-

> tion resulting from the hardening operation.

e. Rehardening of Tools. Tools are often rehardened by first annealing the hardened tool. followed by a requenching and a retempering operation. The amount of distortion in the original hardening operation which resulted from inherent distortion will be removed by the annealing operation, but the distortion resulting from warpage will not be removed and will re-occur a second time in the second hardening operation. Thus, a tool which shrank in the amount of 0.010 in. on one dimension as a result of the warpage factor associated with its size and shape will



IN 1 / THE TIME -AT /2 THE COST!



#### **OPERATIONAL**

Specification: Nelco Face Mill No. 8106F

Material: S.A.E. 1045 gas cut. Speed - 500 R.P.M. Feed 15" P.M. Compare these results:

With high speed cutters 31/2 min. With Nelco Carbide-tipped cutters 11/2 min.

With high speed cutters COST 334 cts. per piece. With Nelco Carbide-tipped cutters .144 cts. per piece.

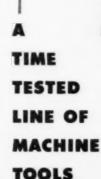
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gar that extra edge in produ NELCO TOOL CO., INC., Manchester, Conn

HE blanks shown are milled six at a time with Nelco Carbide-tipped Face Mill No. 8106F. The floor to floor time is 1½ min. compared with 31/s min. with the high speed cutters formerly used. When all manufacturing costs including costs of tips, costs to re-grind, cost to re-tip and grind, and the cost of the cutters per piece have been compared with similar costs for high-speed cutters, the figures are .114 cents per piece with Nelco Carbide-tipped tools against .334 cents per piece with high-speed tools. This is one of many examples of the way in which Nelco users are saving hundreds of valuable production hours and lowering their costs.



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machine tools

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shrink the same amount on the second treatment, making total shrinkage in two treatments of 0.020 inch.

At this point in our discussion, it should be obvious that there is no tool steel which can be hardened without distortion, despite the amounts of socalled "non-deforming" and "non-distorting" steels which have been sold and used. Since there is a volume change which accompanies the hardening operation, it is fundamental

that there must be dimension changes. Occasionally certain tools will be heat treated with "negligible" distortion and the assumption will be made that the particular grade of steel used is "free from distortion." However, if a tool of different size and shape is made up, the freedom from distortion will no longer be found.

A commonly used distortion test piece is a cylindrical specimen of small diameter and length. As previously

mentioned, it is possible to determine the dimensions of a cylindrical specimen which will not change length at all during heat treatment. Thus, cylindrical specimens, depending upon the dimensions chosen, may give a very optimistic viewpoint on the freedom from distortion of a given steel. If this information is used in connection with pieces of dimensions similar to those of the test piece, it will be very helpful in predicting and controlling distortion; if the information is applied to pieces of different size and shape than the test piece, it will be misleading.



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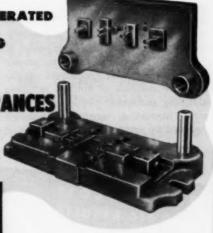
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February, 1951

MODERN MACHINE SHOP

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Although there are no non-distorting steels in the quantitative sense of the word, it is possible on one grade of tool steel, high-carbon high-chromium, to obtain zero distortion on at least one dimension of a tool by proper control of the heat treatment operation. The method of control involves balancing shrinkage produced by austenite formation against expansion produced by martensite formation and

is performed in the following manner:

1. Heat the steel to 1850 deg. F., hold at heat (1 to 3 hrs.) for carbide solution.

2. Air cool (quench) to 150 deg. F. or less. Normally, tools are tempered immediately upon reaching 150 deg. F., but on most tools made of this type of steel, it is safe to cool to room temperature.

3. Measurement of the tools will

show that external dimensions have contracted approximately 0.0005 in. per inch as a result of austenite retained in the quench (air cool).

4. Temper at 920 deg. F. and air cool. In some instances the temper will cause some of the austenite to transform to martensite, and the expansion resulting from the formation of martensite will neutralize the original shrinkage produced in the quench.

5. If the 920 deg. F. temper does not completely neutralize the shrinkage, the tools are retempered at 930 deg. F. to produce the desired expansion, or successively at 940 deg. F., or



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even higher, if required. If the tempering increment is properly chosen, it is possible to bring at least one dimension, and usually more, back exactly to zero size change.

It is not possible to specify a more definite tempering procedure because the tempering temperature required to produce the desired amount of martensite expansion depends upon the exact austenitizing conditions used in heating for the quench. The temperature attained by the tools (not by the thermocouple) and the time the tools are at heat (not the time the thermocouple is at heat) directly control the amount of austenite retained in the quench. The temperature attained by the tools and the time they are at heat will depend upon the amount of steel charged in the furnace, the thermal "head" or heating

capacity of the furnace, the atmosphere in the furnace, and so on, so that the exact austenitizing procedure to be used in this method must be developed with the equipment to be used in production heat treating. A heat treat er who is familiar with his equipment and this type of steel will rarely require more than two tempers to accomplish the desired end. This method of controlling size change has been in use for about ten years.

Following are some additional notes of interest in connection with this method: (1) If shrinkage is not produced in the quench, it usually will be impos-



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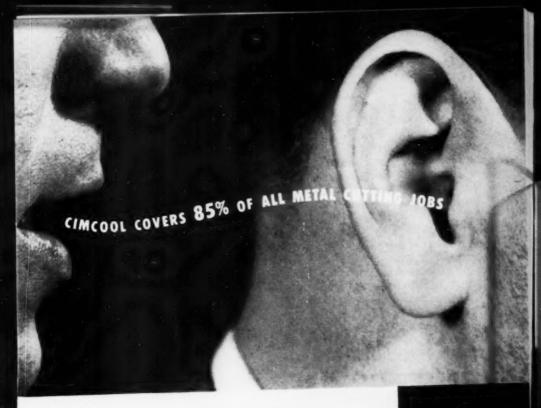


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sible to correct the size changes by tempering. (2) At the point where zero size change is obtained peak hardness of approximately Rockwell C60 is obtained. (3) High tempering temperatures should not be used on the first temper. If conditions were such that a 920 deg. F. or 930 deg. F. draw would have sufficed, the higher temper will produce expansion beyond that desired so that the piece is permanently expanded. The high temper will also cause loss of peak hardness. (4) If an excessively high quenching temperature or an unusually long hold at temperature is employed, an unusually large amount of austenite will be retained in the quench. This may require the use of unusually high tempering temperatures (as high as 1050 deg. F.) in order to obtain the desired expansion. (5) For maximum toughness and resistance to grinding checks, it is advisable to double temper, the second temper being at 900 deg. F., or 25 deg. lower than the temperature used for martensite transformation.

There is one other characteristic of high-carbon high-chromium steel regarding distortion which must be mentioned. As pointed out by Scott and Gray,\* the distortion of this type of steel in the longitudinal direction is about twice as great as in the transverse direction. It is for this reason that dies, where exact thickness is unimportant, are cut from the bar stock so that the thickness is in the longitudinal direction if this is consistent with the direction selected on

<sup>\*</sup>Howard Scott and T. H. Gray, "Dimensional Changes on Hardening High Chromium Tool Steels," Transactions, American Society for Metals, Vol. 29, 1941, Page 503.





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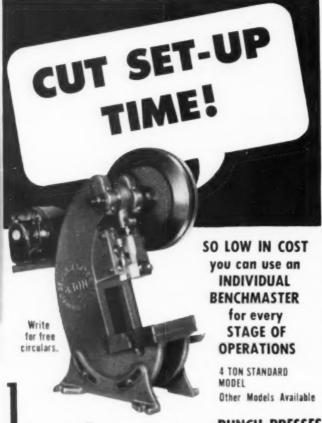
the basis of intended working stresses. While the size change in hardening with respect to the longitudinal direction can be controlled by the austenite-martensite balance method, for precision work it is necessary to recognize the difference in movement of this steel in longitudinal and transverse directions. Generally, a higher austenitzing temperature than 1850 deg. F. is required, in order to obtain the initial shrinkage in the longitudinal di-

rection. This shrinkage can be neutralized in exactly the same manner as outlined previously. However, when zero size change is obtained in the longitudinal direction the transverse dimensions will usually show some expansion.

#### Summary

The practical control of distortion of tool steel in the hardening operation can be carried out as follows:

A. Tools on which little or no metal is to be removed by grinding after hardening. Tools in this class require the use of a good controlled atmosphere furnace to avoid scaling and soft skin (decarburization) which would otherwise require removal. (1) Use high-carbon high-chromium tool steel and heat treat for zero size change on the critical dimensions by the austenite - martensite balance method described in the text. A small amount of grinding may be required on the less critical dimensions, if it is desired to bring all dimensions back to zero size



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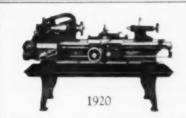
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change. (2) Use an air hardening tool steel, such as the 5 per cent Cr type of steel, allowing for the expected expansion which will occur in the hardening operation. The usual allowance for this type of steel is 0.001 in. per inch, but a more accurate allowance is 0.0007 in. per inch. (3) The required accuracy cannot ordinarily be obtained with oil or water quenching steels, except on the basis of previous experience with tools of the same size and shape.

B. Tools on which an allowance for grinding must be made in order to remove surface scale and soft skin. Tools which are heat treated in furnaces not equipped with atmosphere control will develop a certain amount of scale and soft skin (or decarburization) which must be removed by grinding to produce satisfactory working surfaces. While this grinding operation is being carried out, it is a simple matter to do a small additional amount of grinding to produce the desired dimensions. (1) When using air hardening steels, the methods outlined in A1 and A2 will provide more precision than is actually needed for proper control. (2) When using oil hardening steels, in sections which will harden through, the proper allowances can be made on the basis of inherent distortion "factors." The allowance for Mn oil hardening steel is 0.0015 in. per inch, and approximately 0.002 in. per inch for other oil hardening steels. (3) When using water hardening steels, or oil hardening steels in sections which do not harden through, proper allowances for distortion in hardening can only be made on the basis of previous experience with tools of the same size and shape.

For further information on any product mentioned in this issue—use the READER SERVICE CARDS between the covers.



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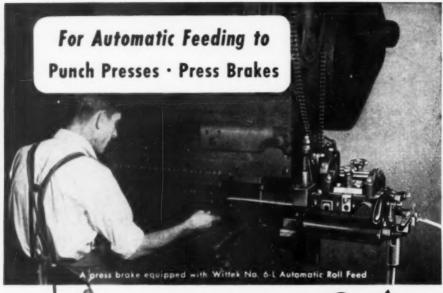
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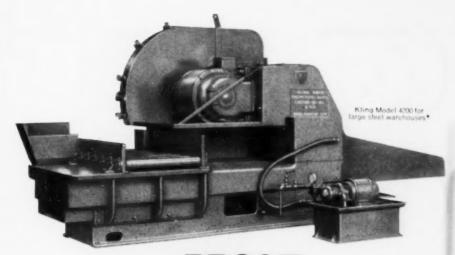
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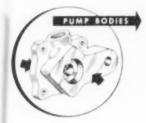




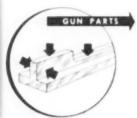


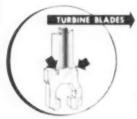


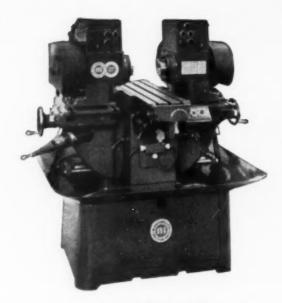












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# Electrical Industry Benefits From Use of Band Saws

The band machining process is ideally suited for short run production.

By H. J. CHAMBERLAND Field Research Engineer, The DoAll Company

A N interesting fact about American industry is that only approximately 25 per cent of all the products manufactured fall into the "mass production" classification. It is therefore not surprising that the "short run" field involves so many diversified and complicated problems because of its wide coverage.

When parts are not processed in mass quantities, that is, in highly specialized equipment, they must necessarily be diverted to more versatile but expectedly less productive machines. Bearing in mind that 100, 1,000 and even 10,000 identical parts can either be accepted as substantial volumes for some products, or truly short runs in respect to other products, the question arises as to which is which and what then. Therefore, it all depends upon the nature of the part and quantity involved in each case; since the prime objective is definitely to hold down cost per unit to a minimum. the management should be in position

to shoulder this responsibility and with satisfactory results.

Many electrical manufacturing plants have discovered that wise choice of equipment, especially to trim down usually exhorbitant costs of socalled short run requisitions, usually pays for itself within a reasonable period of time and modern band machines have by no means proven otherwise. In large plants, several units are used on various electrical parts production to relieve conventional equipment better adapted to other operations. In several smaller plants, a single installation is said to replace as many as five basic type machines, thus saving in capital investment and floor space. The versatility of the band machining process is practically unlimited for this kind of work, its low operating cost permits keeping the machine in continuous production and thus build up inventories.

Machining by the band method involves no set-up time, tool cost is neg-

Fig. 1 — The insulating field coil frames shown here were stack contour cut in a band machine.

ligible as computed on the basis of the number of lineal or square inches each blade will cut if proper saw control factors have been adhered to. The materials herewith concerned are plywood, mica, Bakelite, copper and mild steel. All bands used are of the precision type, meaning depth of tooth hardness is controlled to provide maximum life

under most severe cutting conditions. It is hoped that the few typical applications herewith concerned will prove of value in other plants where somewhat similar requirements are in effect or likely to be.

Figure 1 shows a view of insulating plywood field coils that were produced by means of a band machine. These coils are cut in stacks of six with a ½in.-10 standard pitch band operating at a speed of 1500 f.p.m. A ½ in. starting hole for the band is drilled at one corner of the stack inside the layout line for internal sawing. Cutting the band, passing one end through the starting and butt welding consumes from 3 to 5 minutes; cutting rate on this material is limited only by the



dexterity of the operator.

Figure 2 shows the method of stack sawing mica segments, the height of cut being 11/2 in. and slot depth of 21/2 inch. Cutting time is 30 seconds with a 1/2-4 pitch Buttress special coarse pitch band which is operated at a speed of 1200 f.p.m. The mica is easy to cut, therefore long tool life may be expected without the use of a coolant for intermittent requirements. When mica is to be cut in a continuous cutting operation, speeds up to 3000 f.p.m. may be used. These higher speeds, however, will require the use of a coolant of 1 part of soluble oil to 40 parts of water to prevent gumming of the blade. Laminated mica usually has abrasive characteristics and for this



Fig. 2 — Illustration showing method of stack cutting plain mica segments.

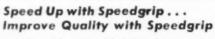
reason saw speeds of from 100 to 150 f.p.m., should be used in consideration of tool life. These slow speeds effect a very profitable compromise for a high cutting rate commensurate with tool cost, no coolant is necessary for cutting mica at conventional speeds or under 1500 f.p.m., a speed of 3000 f.p.m. is considered to be in the

high speed range.

The application of band sawing shown in Figure 3 is also mica and in this case a fixture in connection with the circular cutting attachment of the machine is used for precise duplication of the segments. These segments are used in the manufacture of induction coils and the sheets of mica are 0.012

in. thick. They are cut in stacks of 125 sheets to provide a compact mass for the fixture. All sheets are uniform in width and the stock can thus be securely advanced in the fixture for each succeeding contour cut.

Bakelite slip ring hubs (not illustrated) 6 in. O.D. and 5 in. I.D. are also cut with a  $^{1}_{2}$  in.-4 pitch Buttress





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Fig. 3-Illustration showing method cutting irregular mica segments with use of shop-made work clamping fixture functioning with radius attachment of standard design.

band which is operated at 1500 f.p.m. The maximum speed of this machine is very desirable indeed under these conditions but it is, however, far below any speed used today for cutting plastics and other non-metals on a continuous basis. As for example, Bakelite may be cut faster at 4000 than at 1500 f.p.m. and with an improved finish. When cutting Bakelite impregnated with asbestos or glass, double tool life will result if a speed of 3500

rather than 1500 f.p.m. or less is used.

Copper commutator segments shown in Figure 4 are also being cut by applying the same previously mentioned mica saw cutting attachment. This is proof of the efficiency of the Buttress band which is especially developed for cutting most non-ferrous and non-metals. The cool and free-cutting properties of this tool are due to skip tooth construction, providing

as one advantage the minimizing of the material thickness factor of low speed sawing procedure. A speed of 4000 f.p.m. often covers a work thickness of from 1/2 in. to 3 in., whereas six or more changes at low speeds would be required to meet varying work heights. V-slots in these copper segments are individually sawed in 30 seconds and this is considered a most satisfactory cutting rate. However, 3/4 in. copper stock of this type is known

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Fig. 4-Illustration showing method of cutting copper commutator segments with mitering attachment of standard design.

to have been cut at almost 100 lineal inches per minute with a band saw speed of 3500 f.p.m. Some copper alloys require low speed procedure, with the speed of the saw depending on analysis and thickness.

With the sawing of commutator clamping rings as shown in Figure 5. the material is steel and therefore requires a change of band-a band which is similar in width as that used to cut copper but a 10-pitch standard type. This workpiece is designed for use as an assembly fixture and is therefore not considered a production item. It is used in conjunction with the part shown being cut in Figure 6. This part has already been machined to a length of 10 in. with a 11/2 in. maximum wall thickness. The operation shown in Fig. 6 consists of angular cutting the part into sections. The total cutting time is 1 hour at a saw

speed of 150 f.p.m. Note that this is 150 and not 1500 f.p.m. and demonstrates the advantages of having access to a widely variable speed range. Steel cannot be cut at high conventional speeds, the tougher the steel and the greater the height of the workpiece the lower the speed. Maxi-

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Fig. 6—Illustration showing method of slitting a part of an assembly.

rather than a precision opera-

It is apparent that low, high and super high speeds all have their time and place to suit individual conditions. Until now, no single contour sawing machine could serve for all purposes and in plants where all types of materials are cut, machines of varying capacities and speed ranges had to be used and probably will for a long time to come. However, the multiple machine problem has now been solved to the advantage of many plants by engineering know-how accumulated within the last decade in laboratory research and field experience.

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mum cutting rates on steels are however possible by friction sawing, but the particular process is limited to a 1 in. thick section and this type of operation represents a high production

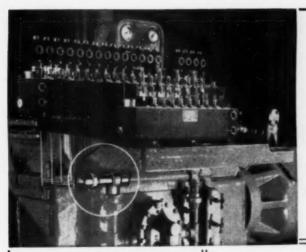
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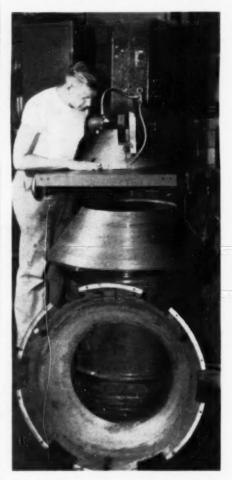


Fig. 5-Illustration showing method of contour machining a steel commutator clamping ring

few of the many new applications for this advanced design of manufacturing-with-a-band machine, plus all operations now executed in all models of contour saws now in use.



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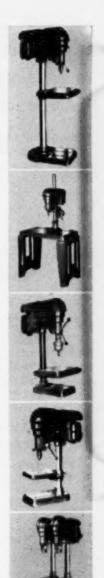
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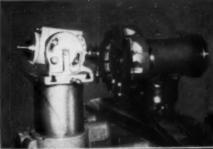
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## Tool Refinements Aid Buick Output

Black light unit used to check carbide bits for cracks also helps to spot causes of failures.

#### By HERBERT CHASE

PRODUCTION specialists at the Buick Motor Division's Dynaflow transmission plant are constantly devising ways of making tool bits do their jobs faster and with less downtime for grinding and resetting. Improved methods of grinding bits, along with lower grinding costs, are also sought.

One of the latest pieces of equipment added is a Zyglo unit for revealing cracks in carbide tools by subjecting them to "black" light, since it is well known that cracks precede and usually result in failure of carbide tips and solid carbide bits. This unit is employed to check against cracks in new bits as well as to determine the cause of cracks and failures in service.

Therefore, bits are sometimes checked after each operation or series of operations so as to learn, if possible,

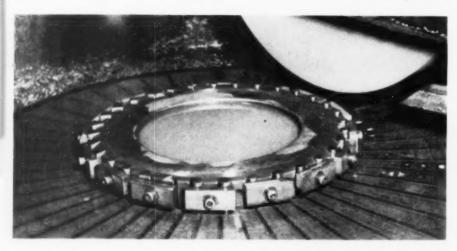
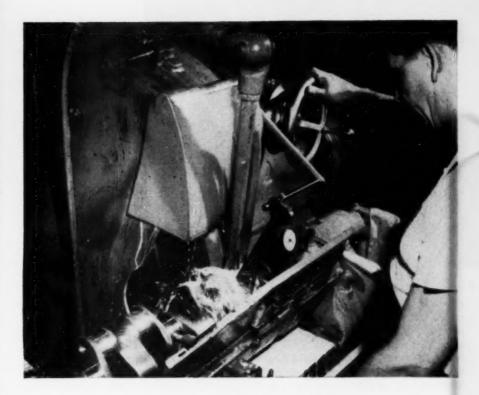


Fig. 1—This convenient fixture is designed to hold 32 solid carbide bits of circular, square or triangular section. All bits are positioned with top ends at the same level and are ground at one time with high economy.



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Fig. 2—Considerable grinding of carbide bits is performed on this machine built especially for Buick and having a finer feed than conventional machines. A Hammond fixture is shown in use.

when and why failures occur. This procedure often leads to changes in speeds and feeds when those being used have been found to account for bit failures. Or, when changes in speeds or feeds are tried, the black light check helps to determine the optimum combination and to find when the speeds and feeds used exceed the economical limits. Other checking methods are applied to grinding to learn whether the speed of diamond wheels is correct or may result in cracks developing during grinding operations.

Considerable economy in grinding

solid carbide bits has been attained with the fixture shown in Fig. 1. This fixture is designed to hold 32 bits in slots located around the periphery of

a ring equipped with clamps each pair of clamps being held by a bar that is locked with a hollow-head screw. Slots accommodate bits of square, triangular or circular section, and each bit is held solidly and at right angles to the face of the ring. The fixture is used on the face of a magnetic chuck in a Heald 25A grinder. By means of this fixture, the end of each tool is ground square.

When bits are clamped in the fixture, it is inverted on a mating ring having a low step, against the face of which the end of each bit rests. Thus,

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all end faces are brought into the same plane, and all bits project above the ring the same amount when it is turned over and placed on the magnetic chuck for grinding. All 32 bits are ground in a single operation, of course, and, since the setup is very quickly made, the cost per bit ground is low.

For grinding single bits, use is often made of the machine shown in Fig. 2 which was built to Buick specifications to provide a finer feed than with standard machines. This machine uses a cupped diamond wheel and is reported to result in better grinding and greater tool life, the latter because of the finer feed attained. Various grinding fixtures can be applied to this machine, however, that preferred for much work is the Hammond fixture shown in use in Fig. 2, since it is equipped for convenient and precise means of adjustment.





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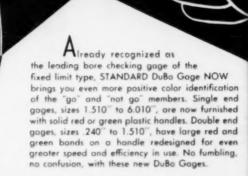
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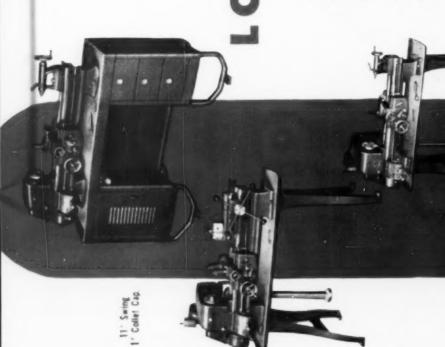
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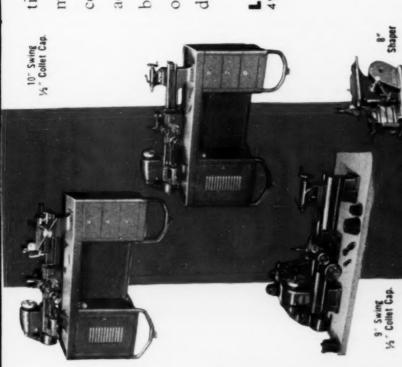
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# Progressive Dies and Their Machines

C. W. Hinman

The application of hitch and die feeds to progressive dies is explained, together with a particular type of die for the multiple cutting of parts.

By C. W. HINMAN Designing Engineer

It is quite obvious that during the coming months, greater emphasis will be placed upon the production of equipment and supplies with which to equip our expanding armed forces. Fortunately, many of the production methods employed in the manufacture of consumer products can and will be readily adapted to the production of

the much needed war materiel.

The American armed forces must be furnished all the supplies and equipment without which a modern war cannot be fought successfully. Many of the parts that go into the manufacture of war materiel will be produced in the pressroom and largely in progressive dies. These facts may suggest

that starting today those of us who are engaged in mechanical production must devote more time to the development of better tools and the improve-

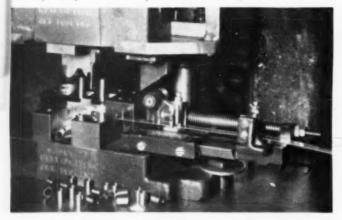


Fig. 1 — Illustration showing a progressive die equipped with a hitch feed.

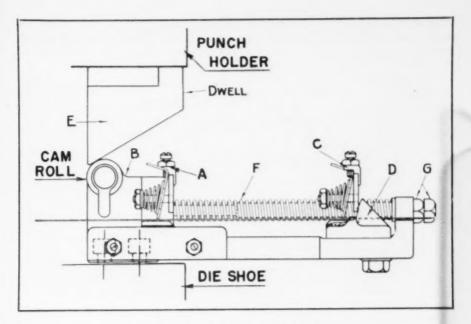


Fig. 2-Drawing of hitch feed in skeleton form.

ment of present methods of manufacturing. It is hoped that from a study of some of the basic methods and principles used in the manufacture of consumer products, the inspiration will be found to adapt a few of these methods and principles to the manufacture of the more urgently needed products now.

#### Progressive Die with Hitch Feed

A hitch feed affords a rather inexpensive piece of equipment for use in the feeding of light gauge strips through progressive dies. Fig. 1 shows such a feeding mechanism located in position for feeding a die. A hitch feed is shown in skelton form in Fig. 2, and a similar feed, known as a die feed, is illustrated in Fig. 3. Fig. 4 shows a die feed setup on the right-hand end of a progressive die. The

feeds illustrated in Figs. 2 and 3 are stripped of all parts except those which are essential to the explanation of their operation.

In Fig. 2, coiled compression spring F feeds the work strip when cam E ascends on the upstroke of the press. The two "pinch check" blades A and C grip the work strip on its top surface and feed it into the die. Hitch feeds of this type are designed to handle strip 8 inches wide x 1/32 inch thick and with blanking centers up to 4 inches.

The die feed shown in Fig. 3 employs the same mechanical principle as the hitch feed illustrated in Fig. 2 except that the work strip is gripped by cylinders A-A and C-C instead of the pinch check blades. This type of feed is designed to handle strip 4 inches wide x is inch thick and is more

ruggedly constructed than the hitch feed. It is also equipped with double horizontal feeding springs, as shown at F-F. Both the hitch feed and the die feed can be used in three feeding positions; namely, left to right, or vice versa, and from front to back.

Figure 4 shows a nine-station progressive die for producing a nut chopapproximately 40 per cent of the increased production, while mechanical feeding accounts for the remaining 60 per cent.

#### Progressive Dies Cut Multiple Parts

Figure 5 shows a four-station progressive die which is designed to fabricate several pieces of work simul-

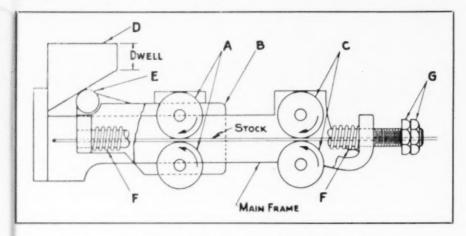


Fig. 3-Drawing of die feed in skeleton form.

per cutter as made by the Federal Tool Corporation, Chicago. These cutters were formerly produced in three separate operations in three presses, three operators being required in order to produce 900 finished pieces per hour. With the nine-station die, equipped with a die feed and using 0.042 x 1% -inch cold rolled steel in coils, all required operations are performed progressively with a piece completed at each press stroke, the rate being 5,000 pieces per hour. The result is an increase in production of over 450 per cent using only one-third as many presses and only 8 per cent of the man-hours formerly employed. The progressive die alone accounts for

taneously. The largest piece of work shown at the left of the punch holder is a movement plate used in a Gilbert clock. It is made from 0.040 gauge hard rolled brass strip, and the several smaller pieces shown with it are punched from the strip.

All die blocks are mounted on the die shoe shown in the lower view of the illustration, and the die shoe when set up in a press in conjunction with punches in the punch holder enables the movement plate, two gears and three smaller parts to be pierced and blanked at each downstroke of the press. Above the die shoe, the punches are shown assembled in the punch holder, while at the left and under



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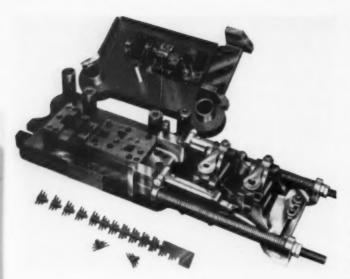


Fig. 4 — Die-feedequipped nine-station progressive die for producing nut chopper cutters.

of lubrication. The material strip is fed through the die by an automatic die feed as previously illustrated and described.

the workpieces is a view of the stripper plate which has been removed from its position over the die blocks and turned over to show details of the die blocks and plate.

The portion of scrap strip pictured at the top of the illustration shows the four stations in which the work-pieces are completed in the die. Four substantial guide posts are employed in the die to ensure accurate alignment between all punch and die members, and phosphor bronze guide bushings are inserted in the punch holder and provided with a constant supply

### Principles of Design and Construction

In the progressive die shown in Fig. 5, the die blocks and punch plates are confined within slots milled the entire length of the die shoe and punch holder. These slots help to maintain punch and die alignment and to decrease the shut height of the complete die. The die is divided into sectional blocks so as to eliminate the danger of fracturing when hardening and to facilitate subsequent repairs. Round holes in the die blocks are provided with thin walled hardened and ground bushings

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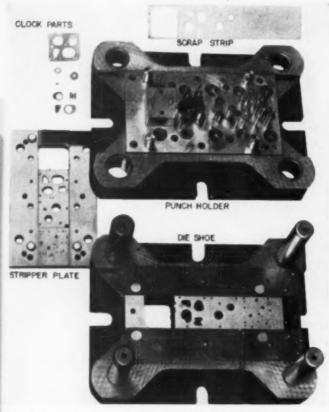


Fig. 5 — Four-station progressive die for producing six different workpieces at each press stroke.

Morever, the size of the holes can be changed after the die has been built by substituting a bushing having the desired diameter of hole.

The channel stripper plate is made by using two separate strips, one on each opposite side of the die, instead of attempting to mill a channel in the stripper plate itself. With this type of construction, the channel width which

guides the strip is easier to correct for wear than if it were milled in a solid piece. The central portion of the stripper plate consists of four hardened and ground sections which are

which provide a means for correcting the shapes and positions of holes if distorted by hardening and also permit repositioning of holes after hardening by regrinding their interiors.

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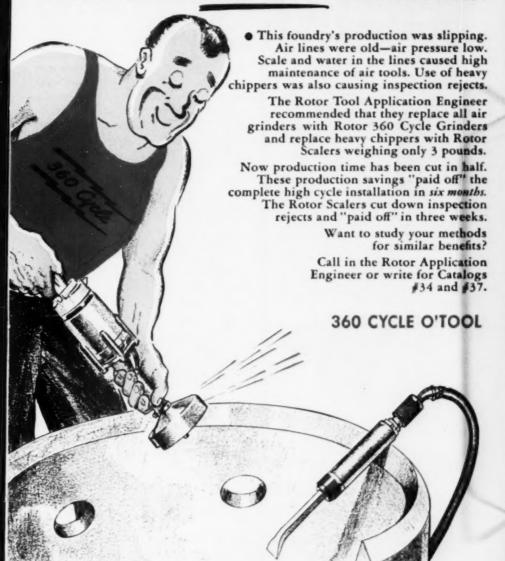
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The punch plate is divided into two sections so as to facilitate manufacture, change, or repair. The round punch bodies have larger diameters than their corresponding points and are guided through shouldered bushings inserted in the stripper plate. This arrangement provides for maximum stability of the punches and thus ensures the production of accurate work. Four bumper pins inserted in the punch plate sections control the shut height of the die by contact with the die shoe on the downstroke of the punch holder. These pins facilitate setting up of the die in a press and compensate for a possible loose worn bearing in the press slide or in the crank arm.

The interiors of all die openings are accurately ground to size throughout the thickness of the die blocks to ensure long-lasting accuracy of operation. After locating and boring all holes for the punches and die blocks, the work blocks are hardened and the holes ground. The die is then assembled and tried out for immediate use. Dies of this type can be used in standard gap frame presses; however, where maximum production is desired, they should be employed in suitable presses of higher speed.

(Illustrations turnished courtesy H. E. Dickerman Mig. Co. and Moore Special Tool Co.)

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# Mirror Finishes on Carbide Tools

From a talk presented by the author before a Wooster, Massachusetts meeting of the Society of Carbide Engineers.

By S. W. LOVEJOY

Tool Supervisor, West Lynn Works, General Electric Company

WHEN a surface is given a mirror finish, the implication is that the surface is shiny and mirror-like in appearance. It also implies that grinding or lapping marks cannot be detected without the aid of a high power glass and that a reflected image from the surface is clear and distinct. If the surface is not flat, some distortion in the image may be noted, but there is no fuzziness of definition. This condition occurs only on surfaces which measure under 1½ micro-inches, although the mirror effect persists on surfaces up to five or six micro-inches.

The advantages of a mirror finish for carbide tools are: (1) Greatly reduced resistance to chip flow on the face of the tool and consequently less frictional heat. This, is turn, reduces the tendency to load or weld. It follows that cratering, which is the result of welding, is also minimized; (2) Greatly reduced frictional heat, due to the rubbing of the tool flank on the work directly under the cutting edge. On form tools, where no relief can be tolerated, this again retards loading and resultant poor finish on the work; and (3) A much keener cutting edge is the re-

sult of the intersection of two refined surfaces in different planes. The more refined the surfaces, the nearer the cutting edge approaches a true straight line and this condition is reflected in the finish on the work.

### Substantial Increase in Tool Life

The three advantages noted above result in much longer tool life or pieces per grind. This increase has been reported by various people to be anywhere from 200 per cent to 6000 per cent, depending upon the application and the material being machined. Many case histories could be cited, but the following are typical of those with which I am personally acquainted. All of the comparisons are between mirror finish and good commercial finish as produced with a 320 grit wheel.

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All of these case histories have been thoroughly checked by impartial investigators and the resultant savings in manufacturing costs have been realized. In still another plant, I have been told that the use of mirror finish on tools for machining magnesium has made possible operations which could not be done by any other known means.

It is quite possible that the method used to produce mirror finish does not stress the surface of the carbide, as does periphery grinding. So far as is known, no nondestructive method has been developed for detecting stress in a carbide surface unless that stress is sufficient to produce surface cracks or discoloration. However, many failures of the cutting edge or surface have

been observed which could be explained only by the presence of such a stress. Dr. L. P. Tarasov, who is with the Research Laboratories of the Norton Company, has published some very enlightening observations on this type of surface stress in steel.

The method used to produce a mirror finish on carbide tools is comparatively simple. A cup, or dish-shaped wheel of reasonably fine diamond grit size (220 to 380) is used on either a vertical or horizontal surface grinder. The wheel must be in perfect balance and the spindle free from end play. The table travel must be smooth and true and the wheel should be allowed to pass off the work on both ends of the stroke. The down-feed and in-feed per pass is governed by the grit size of the diamond wheel, the diamond particles extend beyond the bond by an amount approximately 0.0004 inch

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which is, roughly, 20 per cent of the diamond particle size. The amount of in-feed, or down-feed, which is recommended for this type of wheel is half of the exposed diamond depth, or 0.0002 inch. This amount provides for chip space between the cutting points and prevents loading or glazing of the wheel. Coarser wheels may be used

with increased feeds and, therefore, remove stock faster.

Regardless of the wheel used, the feed on the wheel should be reduced 0.0001 and then after no further sound can be heard, the wheel should be passed over the carbide surface several times without any feed. This method is similar to that encountered in the

"Sparking out" method frequently used on steel.

Table travel, while finishing, should be approximately 30 inches per minute, although a faster speed may be used while down-feed is being used. Ordinarily five to ten passes will be found to be sufficient to produce the required finish.

### Water Coolant Preferred

The described method of producing a mirror finish on carbide tools by grinding only is economical when a large number of similar tools or flat surfaces are involved. A coolant, preferably, one of the water compounds, containing a wetting agent and



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rust inhibitor, is recommended to prevent loading or glazing of the wheel. However, dry grinding with resinoid bonded wheels to produce a mirror finish has been done successfully.

Wheel speed may be in the range between 4500 and 9000 S.F.M. Very satisfactory results may be obtained at 5000 S.F.M. The higher speeds give faster grinding and possibly better wheel life.

In the small shop, the method of producing a mirror finish just described would be too costly to be economical. In one plant with which I am familiar, the tool is held by hand against a wooden lap in the shape of a cup wheel. The wooden wheel is charged with fine diamond compound. The kind of wood used does not seem to be important. Orange wood, maple, pine, birch, lignum-vitae, and bass wood may be

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used. I have also seen hard felt wheels used, but the use of this type of wheel has a tendency to round the edges of the carbide tool and is not recommended for that reason. A good flat ground surface, preferably produced with a copy wheel, is necessary before hand lapping is started, but this ground surface need be no finer than approximately ten micro-inches, which may be considered a good commercial finish. One very simple method of mirror finishing flat surfaces is to lay a piece of ordinary hard finished paper on a surface plate, smear diamond compound on the paper and rub the

















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tool over the charged portion of the paper, keeping the tool surface perfectly at all times.

### Off-Hand Lapping Methods

Any number of off-hand lapping methods may be used which will effectively produce a mirror finish on carbide tools. Obviously, the finish may not be as perfect as that produced by machine, but quite often will be found practical under ordinary shop usage.

In all of the methods described, you will notice that conditions which might produce heat are avoided. The side wheel method of grinding makes use of very low unit pressure of cutting surface distributed over a considerable area. In contrast, periphery grinding employs relatively high unit pressure along a single line of contact. The amount of heat of grinding in the latter case is relatively extreme, although it is quickly dissipated. Rapid changes in temperature are much more injurious to carbides than to steel and should be avoided for that reason.

Carbide tool manufacturers are now equipped to give you mirror finish if you request it. Some of them make an additional charge of 5 per cent to 10 per cent, but many make no extra charge at all. I would not hesitate to recommend mirror finish for tools of all description used on ductile materials. It is suggested, however, that you experiment with mirror finish on your stainless steel jobs. It has been used successfully on furnishing broaches, blanking and forming dies, drawing dies and many wear applications.

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# Management Looks to Foremen for Leadership

Industrial management, facing critical manpower shortages and increased production demands, looks to its foremen for leadership manpower to solve production problems and lead hard-hitting management teams.

By EDMUND MOTTERSHEAD

WHAT makes a good boss? What are the personal characteristics, performance habits, special abilities, and traits of the individual whom workers look upon as a "good boss?" Whiting Williams says that in discussions with worker groups in all types of industry he is never able to start an argument by asking the question: "Would you rather have a punk job with a good supervisor or a good job with a poor supervisor?"

With a return of American industry to a semi-war footing, we find new problems facing the industrial supervisor or foreman. Where in 1941 we had a vast reservoir of unemployed and women workers who were not employed and not previously in the "labor market," we have today serious shortages of workers in certain skills, and an over-all problem of worker scarcity that is costing industrial leaders and government planners many sleepless nights.

Robert G. Goodwin, head of the Office of Defense Manpower, recently stated that our present labor force of

some 65,000,000 can be increased an additional 5 million by drawing from those at present unemployed, from women, from handicapped workers, from retired workers, and from young people. He also intimated that our average 41-hour factory work week might have to return to our wartime 46-hour average. There might also be some shift from "less essential" civilian production to defense production jobs. However, with all of these sources of labor, there are both drawbacks and limiting factors which make the outlook on the whole manpower picture very uncertain.

Add to this picture the rising cost of living, which is predicted to reach 185 or more on the BLS index by July, 1951, the continued pressure from organized labor for wage increases, and the reluctance of government to impose any "draft of labor," and it becomes increasingly apparent how vital it is that foremen and supervisors exercise those qualities of personal leadership which will help reduce labor turnover and stimulate loyalty

and productivity from the working force.

What makes a good supervisor? What makes a good boss? Companies such as McKesson & Robbins, Proctor & Gamble, and SKF Industries, to mention a few who have attracted recent attention, have been devoting substantial time, effort, and top level planning to the development of hardhitting management teams. Whether the supervisor is a group-leader at the lowest level of supervision, or a plant manager, modern problems require that he be much more than "just a boss." In the various supervisor training courses conducted for supervisors and executives in business and industrial organizations, it has been discovered that certain problems stand out as more or less common, not only to those men and women who are facing supervisory responsibilities for the

first time, but also to the older and more experienced men who are facing new problems.

It has been found that in meeting these problems there is almost always one prerequisite; an analysis of the supervisory job followed by an analysis of the individual's characteristics and abilities to handle that job. Certain basic qualifications are essential to successful supervision. While the technical elements of the task vary from industry to industry and plant to plant, and while degrees of authority and responsibility make the executive functions of supervisors different in different circumstances, the basic human relation tasks remain much the same. The first step in improved supervisory performance in leadership functions is a self-analysis to see how well the individual measures up to his task.



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Reprinted in full at the end of this article is a self-analysis rating sheet used in supervisor training programs in many organizations in divers industries—companies which have from as few as 6 or 7 supervisors to 100 or more. Instead of asking anyone to rate himself on a hypothetical score of, say, from 1 to 10 points on some vaguely defined character trait, the

items of leadership performance have been set down on the basis of the familiar "multiple choice" questionnaire.

A short paragraph begins each section, explaining clearly just what is meant by the performance characteristic being considered. Following that are several questions about the personal performance, behavior, or reaction of the supervisor who is rating

himself. 1, 2, 3, or 4 points are awarded for each answer as indicated, and a space is provided for the total score on each item. 10 points is the hypothetical "perfect" on any one item.

However, one or two things should be kept in mind. There is no "passing score" on this rating sheet. The purpose of the entire self-analysis is diagnostic rather than critical. If the individual has sufficient sincerity of purpose to do the rating, he should be able to put down reasonably honest answers to the questions. His eventual score will clearly indicate his "strong" points as well as his "weak" points in leadership



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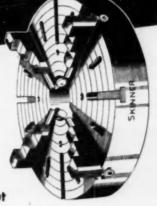
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performances as a supervisor.

Questions 1 and 2 should be interpreted a bit loosely as to terminology. It is virtually impossible to devise a general questionnaire of this type which will fit each job and each foreman or supervisor like a glove. However, quotas or definite objectives, charts, graphs, or perpetual inventories, and the tasks of making personal contacts with employees exist in all

supervisory jobs. Supervisors find their personal time dissipated among a host of unanticipated events and small emergencies. Work which should be done piles up through failure to organize and streamline the way they spend their effective time on the job.

Questions 3 and 4 cover the ability to say the right thing at the right time in the right way. Especially im-

portant is the fact that the normal industrial job carries with it a highly specialized working vocabulary which to a large number of new workers is entirely strangeconsequently they misunderstand and make mistakes simply because they didn't know what the supervisor was talking about.

Line and staff relationships exist as such in only the large organizations where certain functions of planning, reseach, personnel and other specialized tasks are delegated to a certain department of specialists who have no "command function" but who



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service all other departments in the organization.

The problem of developing suitable supervisory understudies and of delegating responsibility is especially acute in industries where supervisors' work seemingly is made up of countless petty details, each one of which must be handled correctly and speedily in order to expedite production as much as possible. The only way to handle much of this load is to delegate it to assistants and understudies.

In applying this rating sheet to your supervisors (or to yourself) bear in mind that such a self-analysis is at best merely suggestive. It contains no panaceas, no cure-alls for psychological or organizational ailments. It is primarily a starting point for constructive thinking about improved leadership performance in the shop.

When we consider the question "What makes a good supervisor?" we must start with the individual, with his personality and performance. When we know what we have to work with, we have half of the information we need. The other half requires an analysis of the job itself, the situation which the supervisor must handle.

The supervisor's job itself consists of three main phases: technical, executive, and human relations. The technical aspect of the supervisor's job includes the methods, operations, materials, machines and skills which go into getting the work done. The executive phase of the work includes his responsibilities in planning and managing. The human relations side of his job is that of handling people, motivating them and leading them to greater efficiency and more effective productivity.

(TURN TO RATING CHART PAGE 206)

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# Supervisor's Self-Analysis Rating Chart

### 1. ESTABLISHING PERSONAL WORK OBJECTIVES

Personal objectives, whether in terms of volume of work accomplished, units of production, safety records, or personal income achieved, are the basis of systematic professional supervision. Well planned personal routines make the difference between a good supervisor and an outstanding success.

Α.	production "quotas" set up in terms of			
	specific results in your dept.?	(0)	(2)	(3
	Seldom	Sometime	s Usually	
B.	Do you set yourself performance stand-			
	ards and then rate your work?	(0)	(1)	(3
	No	New and Then	Atways	
C.	Do you set yourself a definite goal of			

C. Do you set yourself a definite goal of maintaining frequent contacts with your workers for the purpose of developing greater mutual understanding? (0) (1) (4)

Total score on establishing personal work objectives:

### 2. ORGANIZING YOUR PERSONAL TIME

Time is not only your greatest asset, it is also your greatest source of "extra results" . . . your opportunity to advance yourself. Budgeting your time is the productive answer to the problem of getting your job done, educating yourself, and managing your people at the same time.

- A. Do you spend a few minutes each day deciding where and how your time will be spent the next day?

  (0) (1) (4)

  Sometimes Always
- B. Have you ever stopped to analyze how you spend your time by listing for each day for a week just what you did and when, where, for how long?

  (0) (1) (3)
- C. Have you any idea in terms of dollars and cents just how much your "second breakfasts," late lunches, tardiness, and other wasted time have cost you?

  (0) (1) (3)

Total score on organizing your personal time:



Just one base "across the board" for straight cutting, stamping and drawing —even automatics!

You can mix Antisep A. P. Base with just plain water—and meet almost all of your cutting needs. The number of cutting fluids you need is greatly reduced. Minimum handling, smaller inventory and less storage space are required.

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Antisep A. P. Base, high in sulphur and fatty content, is antiseptically treated to eliminate rancidity and definitely reduce bacteria growth. It cleans from work easily in any mild alkaline bath or by standard degreasers.

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### Supervisor's Self-Analysis Rating Chart

(Continued)

### 3. DEVELOPING THE ABILITY TO THINK ON YOUR FEET

The ability to think on your feet, to say the right thing at the right time, is one of the major tools of the successful executive. Professional supervisors are constantly "thinking ahead" of the other fellow as they visit with him over mutual problems, give orders, handle grievances and carry out their other human relations duties.

B. Are you able to converse easily with
your superiors and other supervisors,
guiding them to adopt your thinking?(0) (2)
No Sometimes Usually
C. Can you organize your ideas so that you are so well prepared in your thinking when presenting your ideas that you
never get "rattled" or off the track? (0) (1) (3
No Sometimes Usually

### 4. USING WORDS THAT HIT THE TARGET

Total score on the ability to think on your feet:

Your ability to handle the other fellow depends to a large extent upon your ability to SPEAK HIS LANGUAGE. Words mean different things to different people. It's not always just what you say, but how you say it, and the words you say it with! As Elmer Wheeler says: "Say it with flowers!"

A. The right tone of voice is as important as the words you use. Are you easy to listen to? Is your voice pleasant? Does your tone of voice express your meaning? (1) (2) (3) B. The Telephone Company says: "The voice with the smile wins." Is your voice a friendly voice at all times? (0) (1) (3)Maybe Yes No C. Wordpower means saving what you mean in language the other fellow understands. Do you take the trouble to be sure your technical meaning is always clear to others? Sometimes Usually Total score on using words that hit the target:

# Tell Us Your Production Problems...

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### Supervisor's Self-Analysis Rating Chart

(Continued)

### 5. SUPERVISION MEANS GOOD TEACHING

The professional supervisor is more interested in HELPING his people get out their work, do their jobs correctly, and enjoy life than he is in exacting immediate compliance with petty regulations and red tape. Hence, a large part of his job is EDUCATING THE WORKER both as to the worker's specific tasks, and as to his place in the organization, the importance of his job, and his possible future with the company.

Α.	When you are "educating" a worker, do you start out by putting him at ease,			
	finding out how much he knows about	100	101	
	the work already?		(2)_ Always	_(3
B.	When you are training a worker, do you question him carefully from time			
	to time to be sure he understands?			(4
C.	Do you feel that you know every job in your department well enough to teach	metimes Usually	Always	
	it to a new worker?	(0)	(2)	(3

### 6. SELLING AN IDEA IN A GROUP MEETING

Total score on ability to instruct others:

Under present day conditions, the professional supervisor is frequently called upon to present his story to a group of other supervisors, a board of directors, a management committee, and so on. The ability to handle groups and control discussion adds to your ability to handle one person at a time.

supervisors would you:		0)	(2)	-	(4)
	Make a fas 'pitch' and let it go?			Guide the discussion the way y want it?	m
B. Before you enter a meeting at	which				
you intend to present your idea.	s, how				
do you usually feel?		0)	(1)		(3)
	Cocky	Slightly on edge		Confident, keyed-up	
C. When the group sets up a cross questions and arguments an					
themselves, can you control the t	alk so				
it stays "on the track" and reach	ies the				
decision you want?		0)	(1)		(3)

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#### THE MACHINE

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developed by Clair Menufacturing Co., Inc., of Olean, New York, for finishing back edges of knife blades, pocket knife spring backs, plier sections, large open-end wrenches and ulmilar items.





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#### HOW WORK IS HELD

by MAGNA-LOCK Chucks. Clair Surface Finishing Machines take profitable advantage of the extra holding power of any MAGNA-LOCK Chuck 40" wide, 8" to 14" deep. Rough glaze to misror finishes are obtainable.

#### RESULT

Again MAGNA-LOCK Chucks eliminate need for the usual costly holding fixtures, save hours of self-up time. MAGNA-LOCK'S extra holding power permits greater finishing accuracy on even smallest pieces. And because its top plate is magnetic to the extreme edges, more pieces can be loaded at a time.

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### to all the

- mid you'll go mitting to increase year machine' productivity Water today 1
  - pp you have information the now had NA-VISI yor hadding any material on your chucket

#### Supervisor's Self-Analysis Rating Chart

(Continued)

#### 7. EMPLOYEE RELATIONS

A supervisor's relations with his employees are the back-bone of all organization-wide employee-relations. No matter what good incentive plans, pensions, bonuses, and other benefits are provided, all stand or fall on the basic relationship between worker and supervisor.

A.	Can you criticize people without antag- onizing them?	(0)	(1)	(2
В.	Do your people come to you freely with		nes Usual	
	their problems and difficulties?	(0)	(1)	(2
·C.	Can you accept criticism of your own	Sometin	nes Frequ	ently
	actions without feeling resentment?	(0)	(1)	(2
D.	How often do you really study the man in front of you and make a sincere effort to think in terms of his ideas,	Sometin	nes Usual	ly
	his wants and desires, his problems?	(0)	(1)	(2
E.	Do you really go out of your way to get acquainted and make friends with a worker who is shy and retiring or indifferent or even hostile?	Usually (0)	Alway	(2
	Seldom Seldom	Often	Usual	

Total score on maintaining good employee relations:

#### 8. SUPERVISORY LINE AND STAFF RELATIONSHIPS

Every supervisor has the problem of getting along with other departments, both operating departments and "staff" departments which handle specialized functions for top management. One measure of the success of a supervisor is the degree of cooperation he is able to get from and give to other departments.

(0)	243	, D
(0)	(1)	(3
n Freq	uenily Usu	ally
(0)	(2)	(4
I ho	pe so Yes!	
(0)	(1)	(3
	nelp? and	ome hin help hin
	(0) I hop  (0) this Acce	(0) (2) Those so Yes!  (0) (1) this Accept Welcher his help?

Total score on supervisory line and staff relationships:



SPECIAL 150 Ton Open Yoke Vertical Press with adjustable head member and double-acting cylinder.

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# Fast, Versatile Hydraulic Presses With Hand or Power-Driven Pumps

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The standard 150 and 200 Ton Units include many construction and operating features, outlined in our new catalog. If specifications on the standard models don't meet your requirements, we'll modify them or build a special press as required.

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HYDRAULIC POWER EQUIPMENT

#### Supervisor's Self-Analysis Rating Chart

(Continued)

#### 9. UTILIZATION OF MANPOWER

Apart from his own time, the greatest asset of the supervisor is the time and skill of the people under him. If he were in business for himself, he would have an investment for capital running into many thousands of dollars for each worker, but his weekly "payroll" and overhead would only make that investment profitable if each worker were utilized to his highest degree of effectiveness.

- A. Is every person in your department
  working at the task for which he or
  she is best suited? (0) (1) (3)
- B. Is every person in your department working at his or her highest level of skill and ability? (0: (2) (4)
- C. Insofar as it is in your power, does each person in your department have work flowing to him rapidly enough to keep busy but not so fast that he is swamped?

  (0) (1) (3)

  Seldom Sametimes Usually

Total score on utilization of manpower:

#### 10. DEVELOPMENT OF SUPERVISORY UNDERSTUDIES

Someone has said that the supervisor has three jobs; his own, that of preparing himself for the next higher job, and that of breaking in someone to replace himself. The problem of developing supervisory understudies is not only important because of the necessity for having a qualified substitute available at all times, but also because no supervisor can hope for promotion unless there is someone available to release him for that promotion.

- A. How frequently have you had work tieups because there was no one to take
  over some key job in case of need? (0) (1) (3)
  Several times Once or Almost
- B. Do you make a definite effort to see
  to it that your own key people are
  bringing along understudies to relieve
  them?

  (0) \_\_\_(1)\_\_\_(3)
- C. The last time you were "passed over"
  for a promotion, was it due to the fact
  that you had no understudy ready to
  take over your own job?

  You Maxtee No.

Total score on development of supervisory understudies:

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# FLEXIBILITY

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WORLD OVER

#### Supervisor's Self-Analysis Rating Chart

(Continued)

#### 11. EFFECTIVE DELEGATION OF RESPONSIBILITY

A great many men cling to the old notion that if you want a thing done right, you must do it yourself. However, a man's effectiveness is limited by his own two hands, his own brain, his own time. Obviously, a supervisor must delegate responsibility and authority.

- A. Assuming that you have from 30 to 50 people under you, with how many do you have direct personal contacts in giving orders, planning work,
- AH Half B. When your workers have grievances or complaints, how many times do you handle them personally rather than have your subordinates do so? (0)
- 50.50 Rarely Always C. When you have given a subordinate a particular task, given him enough authority to carry it out, do you back up his decisions and let him carry it through alone? ... (0) (1) (3) I couldn't Whenever do it with

I can.

always

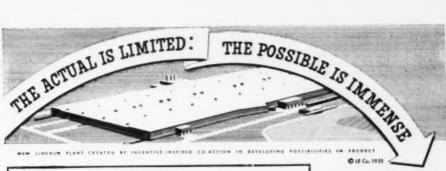
Total score on effective delegation of responsibility:

#### 12. THE FIRST FIVE MINUTES IN HUMAN RELATIONS

In training salesmen we say that the first five minutes in the presence of a prospect will make or break a sale. Supervisors have the same problem in every daily contact with workers, with other supervisors, with their own superiors, The first few moments of personal contact determine to a large extent the results of that relationship.

- A. Are you invariably well groomed, as neat and clean as might be expected?
- Sometimes Usually B. Except for emergencies, are you always thoroughly prepared with information about the other person's likes and dislikes, emotions and prejudices?
- Sometimes Usually C. Can you control yourself so that regardless of your feelings you can face the other fellow with a smile? \_\_\_
- D. When you start to talk to someone, do you immediately get his attention and hold it pleasantly?
- Sometimes Usually No E. Are you more interested in helping the other person make the right decision in solving a problem than you are in getting rid of him so that you can do something else you want to do? (0) (1)

Total score on the first five minutes in human relationships:



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Proceed Design of bearing theiring at Officer Cooperation, Spring, folial Obio, but 3 theory wall pipe and plain formed legs.

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Dy's simple redesign to welded steel, substantial assings are being effected in the production of these bearing housings. At the same time, product strength and rigidity have been increased to assure maximum serviceability. .. I ongy lived operation. An initial saving of \$800.00 on serup and tooling expense results from the elimination of drill jugs and boring fixtures as well as for patterns and core boxes required with the original construction.

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First Changeover to welded steel design has 90° formed legs welded to thin wall tubing. Was welded top and bottom as shown.

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#### THE LINCOLN ELECTRIC COMPANY

CLEVELAND 1, OHIO

#### Supervisor's Self-Analysis Rating Chart

(Continued)

#### 13. HANDLING THE OTHER FELLOW'S EMOTIONS AND PREJUDICES

Human relations are not all easy sledding. Sometimes the supervisor has very tough nuts to crack, people with strong prejudices, emotions that are easily aroused. His ability to handle these situations will add much to his over-all value as a supervisor.

Α.	Do you ever feel at a loss to decide just how to "size-up" the other man in order to get him to do what you want?	(0)	(1)	(3)
	Often	Now Then		
В	Do you find it easy to discover and USE the other fellow's emotions and pre- judices in getting him to cooperate with			
	you?	(0)	(1)	(3)
C.	Do you take the trouble to discover not only WHAT prejudices and emotions the other fellow has, but also how he got	Some	times Usuafi	y.
	that way?	(0)	(2)	(4)

Total score on handling the other fellows emotions and prejudices:

#### 14. BUILDING GOOD WILL WITH EVERY INTERVIEW

The unusual conditions of the war years and post war period strained human endurance and human relationships to the breaking point. The modern professional supervisor needs to take extra care in handling complaints and grievances, avoiding arguments, and in building good will for himself and for his company in every human relationship.

A According to your own best judgment, just what do your people think of you? (0) (1) (3) Strict, but tough fair and B. Are you constantly alert in every personal contact to get to know the workers as people, learn their customs, something of their personal life, know their needs and problems? (2) (4) Prequently Always C. Regardless of your personal feelings, do you consistently maintain a cheerful. friendly attitude toward your workers and other supervisors"

Total score on building good will with every contact:



Old and obsolete machines, like ancient warriors, belong to a bygone day. Good in their time, these machines of the past hamper production, increase costs, help your competitor.

Startling facts reveal the gains you make with modern, late model RACINE Metal Cutting Machines. Designed for today—they cut costs for tomorrow. Give you clean, accurate work and economy in operation. Capacities 6" x 6" to 20" x 20". Single purpose and automatic bar feed production units.

We'll prove our point — without obligation to you — if you will write for FREE production estimates on your specific metal cutting jobs. Address Racine Tool & Machine Company, 1770 State Street, Racine, Wis.



RACINE STANDARD FOR QUALITY AND PRECISION

#### Supervisor's Self-Analysis Rating Chart

(Continued)

#### 15. TEAMPLAY MAKES TOUCHDOWNS

The professional supervisor carries with him at all times the feeling that he is a part of management . . . the most important part of management as far as the workers are concerned. He carries the ball in employee relations for the entire company. His understanding of company policies, company problems, and of the problems and activities of other departments are all part of his ability to carry the ball successfully.

A.	Do you accurately represent company			
	policies to your workers?	(0)	(1)	(3)
	Don't	know No	Usually	
B.	Do you consistently cooperate with line			
	and staff departments in working out			
	your mutual problems?	(0)	(2)	(4)
	Soldon	i iften	Always	
("	Do you follow the rules, carry out com-			
	pany policies, get in reports promptly,			
	cooperate with management so that the			
	rest of the team knows that YOU too			
	are on the team?	(0)	(1)	(3)
	S. M. o	Warmen til	tion Plans His	

#### TOTAL SCORE:

On this self-analysis performance rating, the theoretical perfect score is 150. Just to give you something for comparison with the hundreds of others supervisors who have applied this self-analysis rating,

A score below 90 puts you among the indifferent 60 per cent;

Total score on teamplay in the organization:

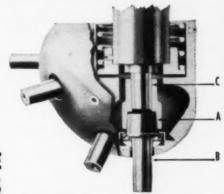
A score between 90 and 130 puts you with the students, 27 per cent of supervisors;

A score between 130 and 145 puts you with the skilled 12 per cent; Over 145 is so nearly perfect that you have really "arrived."



# MORE HOLES PER HOUR - PER DOLLAR

Increase production of any standard drilling machine by adding a Lignormatic, the only drill turret with the patented, self-centering principle that guarantees sustained accuracy equal to the drilling machine itself.



# FOR ALL CONSECUTIVE DRILL PRESS OPERATIONS

PROVED PRODUCTION INCREASE

- Turret indexes faster than tools can be changed or work moved to another spindle. A single Lign-o-matic will release 5 drilling machines for other work and still show increased production and reduced costs on original job.

VERSATILITY—Fits any standard drilling machine without altering the machine. Handles operations such as drilling, reaming, counterboring, and tapping (on reversible spindle machines), up to ½" diameter in any material.

PRECISION — Patented, self-centering tapered drive (A) automatically locks turret spindle (B) into exact alignment with drilling machine spindle (C) for sustained accuracy.

**GUARANTEE** — May be returned in 10 days for any reason for full refund of purchase price. Two-year guarantee against defective parts.

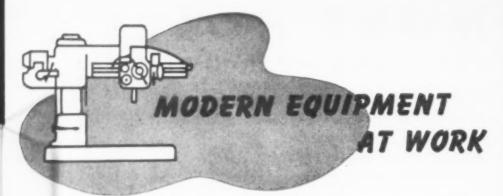
**DELIVERY** - Currently, 2 weeks.



Please rush Lign-o-	matic turrets for
(drill press make)	(size)
(quill dia.) (spindle to	aper)
My name	
Title	

Please send literature on Lign-o-matic turret.
(Attach coupon to company letterhead)

HOWE & FANT, INC.
527 FLAXHILL RD., SO. NORWALK, CONN.

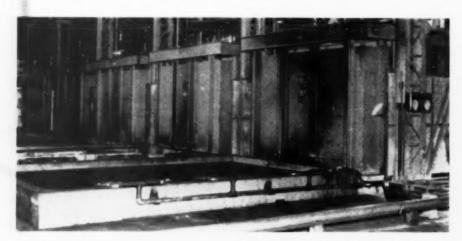


#### Electric Furnaces Provide Savings in Producing Malleable Castings

THE National Malleable and Steel Castings Company, large-scale manufacturer of malleable castings for the railroad and automotive industries, has achieved substantial savings through the use of General Electric annealing furnaces. Five furnaces have been installed, three of

which are high temperature annealing furnaces rated at 390 kw., 460 volts, 3 phase, 60 cycles, and maintaining a temperature of 1,800 deg. F., and two are low temperature drawing furnaces rated at 230 kw., 460 volts, 60 cycles, with a maximum operating temperature of 1,300 deg. Fahrenheit.

Each of the furnaces is designed to accommodate a five-ton capacity load and is controlled by an electrical control system which permits the furnace



This illustration shows live electric furnaces installed in the plant of The National Malleable and Steel Castings Company for heat treating inalleable iron castings. The charge is handled by a gantry crane operating in front of the furnaces and over the quench tanks.

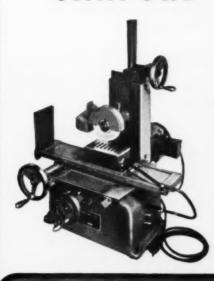
# SANFORD

SURFACE GRINDER

IF IT FITS Model SG

IN THE PALM OF YOUR HAND

GRIND IT ON THE

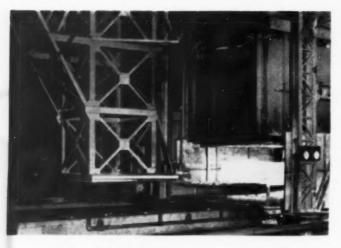




The capacity of this sensitive highly accurate, Bench Model is 4" transverse—8" longitudinal—6" vertical under 4" Wheel. Meehanite Casting s and a very sturdy construction assure long life, vibrationless operation and finishes to micro-inches.

Write for complete details.

SANFORD MANUFACTURING CO.
1021 COMMERCE AVENUE
UNION: NEW JERSEY



An electric crane is shown removing a load of hot castings from a high-temperature electric furnace installed in the plant of The National Malleable and Steel Castings Company.

the furnace. An identical control equally regulates roof heat so that uniform heat is assured throughout the furnace and a high quality of annealing re-

In electrifying the operation of these furnaces, National Malleable has shortened the time cycle involved in producing castings. Two G-E electric cranes are combined to reduce the

to be shutoff independently by a master switch without affecting the other furnaces in the bank. Each furnace has meparate controls that regulate and keep constant the heat on the side of



DO YOU MANUFACTURE PUZZLES?

How many man hours are lost every day in your plant because metal components are not properly marked?

How much time do your customers spend trying to identify parts for reordering?

Are you losing good business because your components are not permanently and legibly marked for *instant identification?* 

Would the use of modern marking equipment save you money?

Simply send prints or samples of parts to be marked, together with exact lettering and its location, for free recommendations.

#### WRITE FOR CATALOG

MARKING MACHINES — ENGRAVED
STAMPING AND EMBOSSING DIES —
SPECIAL MARKING TOOLS — NUMBERING HEADS — HAND STAMPS



is your





GEO.T. SCHMIDT, INC.

1806 W. BELLE PLAINE AVE. CHICAGO . 13 . ILLINOIS

operation of either loading or unloading to single coordinated efforts. A gantry-type crane operating on tracks running parallel to the bank of furnaces carries loads to each furnace. From the control cab of the crane the operator activates a crane hoist, situated above the furnaces, to lift the furnace being loaded. Next, the load is moved forward underneath the furnace and set on supports. The furnace

is then lowered to its base and, by means of a sand seal, form an airtight chamber, thereby providing an atmosphere control and contributing to the reduction of scale on a heated metal.

#### WALTHAM



#### THREAD MILLING MACHINE

Also Pinion and Gear Cutting Machines, Cylindrical Sub-Presses, Cutter Sharpening Machines, Small Thread Milling Machines and Gear Cutters, Small Special Machinery, Write for Illustrated bulletin.

WALTHAM MACHINE WORKS
WALTHAM MASS.

#### Automatic Transmission Pinions Tested at Rapid Rate

THE gear tester illustrated herewith, product of National Broach and Machine Company, is being used by one of the large automotive gear manufacturers to rapidly test automatic transmission low planet pinions for nicks by operating them in mesh with a master gear. A power spindle, on which is mounted the master gear, drives the work pinion which is merely slipped onto its spindle in a workhead that rocks about a central fulcrum, with a compression spring normally holding it at an elevation which allows the pinion and master gear to be in loose mesh so that the work pinion may be slipped on and off readily. In this position, a safety electrical interlock prevents the power from being turned on.

With the work pinion on its spindle and in loose mesh with the master gear, the rocking handle is pulled forward to bring the two gears in close



## Put the "PUNCH" in Punch Presses with a MODERN Motor Drive

No need to use slow speed or geared motors and small pulleys to slow down your presses. Utilize standard 1750 RPM motors.

"V" Belt Drive absorbs shock. Operate smoothly, silently, efficiently, economically. Write to Dept. MS for complete details.

MODERN MOTOR DRIVES DIV. of The Nichols Engr. Co.
Dept. MS, 3816 W. GRAND AVE. CHICAGO 51, ILL.



# BOYAR-SCHULTZ MODEL 6-12 SURFACE GRINDER





Saves more than 20% in time on small jobs

#### COMPARE:

PERFORMANCE -

Flat, accurate surface finish—precision vertical spindle control—fast, easy longitudinal and cross feed operation—less operator fatigue

MANUFACTURE -

High alloy castings—precision parts—ground thread screws—protection against abrasive wear—accurate, long wearing ways—high precision smooth running spindle—needle bearings on all hand wheels—precision assembly

APPEARANCE -

A small machine with big machine accuracy and performance—fits into any shop—streamlined for easy maintenance—sturdy cabinet

COST -

Big machine performance, small machine cost—more value for your tool dollar

#### **BOYAR-SCHULTZ CORPORATION**

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#### on faster grinding

Keep the proper grinding wheel tool dressers handy. For fastest action on medium and coarse wheels use Desmond Huntington Dressers.



For extra service use Desmond's exclus-Ive Hex Dressers (same cutters as Desmond Huntington). When one pair of bearing holes becomes worn loosen cap screw, pull out bearing blocks, and insert them with the pin in the next pair of bearings. Order Desmond Dressers from your industrial supply distributor The Desmond-Stephan Mfg. Co., Urbana, O.

the only complete line of DRESSERS & CUTTERS

mesh or to a predetermined center distance and, at the same time, to release the interlock. Then, by pressing the start button at the right of the machine, the test begins. As soon as the rocking handle is allowed to return to its initial position, power is cut off and a solenoid-operated brake immediately goes into action to stop rotation of



Machine used by large automotive gear manufacturer to test automatic transmission low planet pinions for nicks

both the gear and pinion so as to allow for unloading and reloading the next workpiece.

#### Right-Angle Chucking Lathe Used in Jet Engine Production

THE PRATT & Whitney Aircraft Corp., Experimental Div., East Hartford, Conn., is currently using a 60-inch right-angle chucking lathe de-



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for high quality gears made EXACTLY to your specifications

Regardless of quantity or type, you'll profit by specifying Adams custom made gears for your product. Made on the most modern gear cutting machines by skilled workmen, Adams gears are quality controlled to guarantee exact conformance to your specifications. Write today for further information. THE ADAMS COMPANY, 1942 Cypress Street, Dubuque, Iowa.

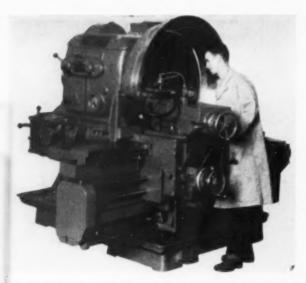
# The ADAMS Compa

Dubuque, Iowa, U.S.A.

ESTABLISHED 1883

FINE GEARS MADE TO YOUR SPECIFICATIONS





Thin-walled jet engine part being machined on rightangle-chucking lathe

veloped by The Lodge & Shipley Company to machine large diameter thin-walled turbojet engine parts. Included among these parts is the huge thin-walled "shroud" of the jet engine. The job of facing this large part provided a considerable problem which was not successfully solved until Lodge & Shipley engineers working in close cooperation with the Pratt & Whitney Experimental Division developed the T-type or right-angle chucking lathe shown in the accompanying illustration.

The large diameter of the "shroud"

PENDING

posed no serious problem; however, the thin walls and the short length of the part made facing extremely difficult with machine tools available in the plant since the thin walls required cuts of relative delicacy and sensitivity, low horsepower and absolute ability of the operator to carefully follow the cutting tool to fine dimensions.

With the right-angle chucking lathe, shrouds and other thin-walled parts are now accurately machined to required dimensions with minimum operator effort. The section of the bed carriage is at right angles to the center line of the lathe; thus, facing at right angles to the center line can be accomplished by movement of the carriage. Facing in and out a total of 31 inches from the center line to the front of the machine, as well as 6 inches to the back, is said to be quickly and easily performed.



Monarch Precision SHAPLANE Radius Tools Illustration shows convex cutter for 1/4" to 21/2" balls.

# FIVE MODELS for LATHES, SHAPERS, PLANERS, BORING MILLS

Range 1/2" to 3" for concave Radii. Also heavy duty models for radii to 6" on planers, etc.

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"down time" costs more today!



· Any way you figure it-in hours, dollars or labor-"down-time" is expensive. And any way you can reduce "down-time" means savings in time, money and man-

You'll have less "down-time" using Apex tools-impact sockets, universal sockets, extensions and adapters -because Apex tools are designed and built to stay on the job, to provide greater freedom from excessive tool breakage and quick wear-out.

Apex manufactures thousands of standard types and sizes, each precision-machined from high carbon electric furnace alloy steel, cold broached and heat-treated to withstand the severe strains and shocks of industrial service. If yours is a special application, just send sketch or blueprint for prompt quotation, without obligation.





CATALOG 19 lists styles, dimensions, type and size of drives. Write, on your company letterhead please, for your copy.



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Safety Friction Tapping Chucks • Vertical Float Tapping Chucks • Self-Releasing and Adjustable Stud Setters Power Bits for Phillips, Freatson, Slotted Head, Clutch Head, Hex Head and Sacket Screws • Hand Drivers for Phillips, Freatson and Clutch Head Screws • Aircraft and Industrial Universal Joints • Sockets and Universal Joint Socket Wrenches.



#### Hardness Testing Sheet Metal Parts

SHEET metal parts are now being tested for hardness in the aircraft industry by means of an automatic Sheet metal parts are shown being automatically hardness tested and certified by means of a newly designed hardness testing assembly.

certifying hardness tester produced by Topflight Tool Company. The tester is said to perform three operations so quickly that approximately 70 per cent of inspection time can be saved. The hardness testing assembly includes an adaptation of a Barcol unit and can be set for the desired hardness. By means

of a conversion chart, Brinell, Rockwell, or Vickers numbers can be certified.

In operation, an impressor needle moves up and down on an anvil. Pieces to be inspected are fed to the needle

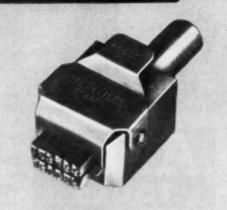
# HERCULES DOUBLE-LINE PRESS HOLDER permits instant interchanging of type!

FIRST to permit two lines of type to be changed by thumb pressure on single holding clip.

FIRST in extra quality of steel and strictly engraved "shoulder style" type.

Write for literature and prices to-





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# Treater Time Saving

Investigate abrasive - and rubber BRIGHTBOY for a really unique action of almost limitless versatility and outstanding savings.

In finishing METALS · WOOD GLASS · PLASTICS ?

The Soft Rubber Binder Cushions The Abrasive THE COMBINATION of abrasive and rubber, working simultaneously, produces

#### **BURRING • FINISHING • CLEANING • POLISHING**

in one, time-saving operation

#### SOME BRIGHTBOY APPLICATIONS

Savings achieved by Brightboy frequently amount to 50% and more when compared to methods previously used. Ask your dealer about Brightboy - and for the Brightboy catalog-manual which gives work-saving suggestions. Write the Brightboy Service Department on any problem where abrasive finishing methods or production

are involved.

WHEELS, STICKS, RODS, BLOCKS for machine and manual operations.



Brightboy Rod in drill press, burr-ing and polishing inside of guide hole.

> Polishing base of elbow tube with Brightboy Wheel.



Cleaning and threads with Brightboy hand tablet.

> Smoothing and burring dural and stainless steel parts with Brightboy Wheel.



#### HOW BRIGHTBOY SAVES PRODUCTION TIME

- 1. Bridges the gap between the rough grind and the buff.
- 2. Works to close tolerances: can be shaped to contour.
- 3. Produces a wide variety of conventional and special finishes and patterns; frequently the final polish.
- 4. Requires no before-use preparation or dressing; no skilled labor to handle it.

#### SOME BRIGHTBOY USES

Removing light digs, tool and heat marks. Cleaning welded and soldered joints. Finishing dies and molds, Burring stampings, castings, machined parts.







America's Pioneer Manufacturers of Rubber-Bonded Abrasives

and anvil and, when the point contacts the part, a dial reading is visible and a green light flashes if the piece is of the required hardness. A stamp then automatically certifies the piece and, at the same time, a counting device registers the total pieces inspected. When a metal part is not of the required hardness, the green light will not flash, the stamping die will not function, and the counter will not register. The entire operation is automatic except for feeding the parts to be inspected which is done manually.

#### Gas Meter Part Production Improved Through Brazing

BY a change from casting to brazed construction, the Win Mfg. Co., East Haven, Conn., is now able to produce an illuminating gas meter part



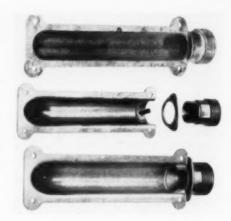


Fig 1—(Top) Illuminating gas meter part produced by former casting method; (center) exploded view of gas meter part produced by brazing method; (bottom) assembled view of brazed gas meter part

of the type shown in Fig. 1 more quickly, efficiently, and economically. The part, which must be 100 per cent gas-tight, consists of two stampings and a screw machine part which are joined with a half ring of  $\frac{1}{10}$ -inch Easy-Flo 45 wire (arrow).

Figure 2 shows the setup devised by Win engineers for performing the brazing operation. Parts taken from the cleaning bath at the left are fluxed and assembled in the positioning fixture with the half ring of Easy-Flo 45 preplaced at the joint. After fluxing of the assembly has been completed, it is



# So Rugged...

it saves time and costs in your toolroom!

C/R's

# New JAW-HEAD Rawhide HAMMER



 Other C/R striking tools: Rawhide Mallets, Rawhide Mauls, Solid Head Rawhide Hammers.

C/R's law-Head hammer is rugged enough for the toughest striking operation. Yet it's extremely gentle to fine finishes and delicate machine parts. C/R replaceable rawhide faces are made from tightlycoiled, resilient water buffalo hide . . . the material that can't be beat for durability and protection. And they're so easy to replace . . . just loosen a nut, change to new rawhide faces, tighten nut and the hammer's ready for use. Safety-Flare grip handle prevents slipping. For the best in "soft" striking tools, get the C/R Jaw-Head Rawhide hammerl

For further information, please write to Dept. 07

Out with
the old face
— in with
the new!



To release jaws, loosen this nut.



Change to new C/R Rawhide faces.



To tighten nut, use wrench for best results.

Available from leading industrial suppliers.

CHICAGO Chicago 22, Illinois

Chicago Kawhide mailets and hammers are stocked and distributed in Canada by Super Oil Seal Manufacturing Co., Ltd. Hamilton Onlario

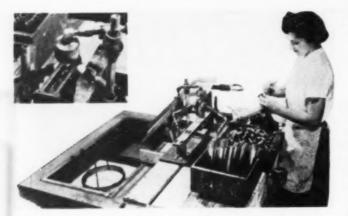


Fig. 2—Setup used in brazing illuminating gas meter part shown in Fig. 1

then placed on the brazing fixture and moved into position under the gas-air burners. An automatically timed mechanism moves the fixture away from the burners at the end of the heating period. While one assembly is heating, another is being prepared. In this manner, the operator keeps production moving along in a steady

flow. Working two eight-hour shifts, with one girl per shift, output averages 2.600 parts a week.

The brazing wire used is a product of Handy & Harman.



#### PRECISION GRINDERS

## for tool room or production work

Baldor's No. 8100 shown here is a ½ HP, 1700 RPM deluxe grinder for sharpening lathe tools, drills, taps, etc., and is also excellent for such production work as grinding off metal burrs, weld seams, etc. Close tolerance work is possible due to vibrationless operation of dynamically balanced armature.

Complete as shown \$88.00

Phone your industrial distributor now or clip this ad to your letterhead and mail for Bulletin 338.



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Grinders • Motors • Battery Chargers 4380 Duncan Ave., St. Louis 10, Mo.

# Palmer Shile AIR SAVER Leak Proof AIR VALVE TO Get Split-second Air Control! Get Split-second Air Control!

FOR MAXIMUM MACHINE
TOOL EFFICIENCY

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PALMER-SHILE Air Saver air valves give you perfect, leak-proof air power control every splitsecond of machine tool operation. AIR SAVERS are ideally suited to applications where air is used for cleaning, drying, cooling, positioning or ejecting. AIR SAVERS are recommended around punch presses, die casting machinery, drill presses, in reaming, broaching and many other operations. AIR SAVERS may always be depended upon to provide ample air volume for operation of single or multiple jets. AIR SAVERS may be mounted in any position, to operate at any angle unaffected by vibration. MANUFACTURERS AND OPERATORS: for splitsecond air control and maximum machine tool efficiency, build Air Saver air valves into your new machines. Or install Air Savers in machines you now 50801 have in oper-

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EXTRA LONG VALVE GUIDE

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REVERSIBLE OPERATING ARM

Immediate Delivery

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\$16.50

Palmer Shile Co.

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DETROIT 27, MICH



Screening Feeder Desludges Machine Tool Coolant Liquid

A LARGE manufacturer was having trouble with steel filings and abrasive grains filling up the coolant tank of his grinders. To overcome this difficulty, the Syntron Company was called upon to develop a vibratory screening feeder for installation on the edge of the coolant tank, as shown in the accompanying illustration. The used coolant from the machine tool

Vibratory screening feeder installed on edge of grinder coolant tank desludges coolant for reuse.

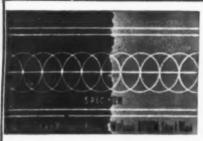
passes through the vibrating screen which catches the steel filings and abrasive grains and feeds them as sludge into a receptacle with the desludged and clean coolant liquid going back into the storage tank for using over again.

The use of this screening feeder has effected quite a savings in that it has eliminated a 30-minute period at the end of each shift that had been required to enable the operators to clean out

the coolant tank for the next shift. It is estimated that the feeder removes approximately 90 per cent of the sludge from the coolant.

#### Dye Penetrant Method Used to Inspect Swaged Cable Fittings

A SHOP engaged in the production of swaged cable fittings is currently using "Dy-Chek," the dye penetrant method of inspection, for check-



#### DYKEM STEEL BLUE

Stops Losses in Making Dies and Templates

Simply brush on, right at the bench: ready for the layout in a few minutes. The dark blue background makes the scribed lines show up in sharp relief, and at the same time prevents metal glare. Increases efficiency and occuracy,

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SPINDLE THREADED 11/2"-8 TO FIT L-W 5" UNIVERSAL CHUCK

Heavy duty headstock and tailstock designed for maximum rigidity. Alloy steel threaded headstock spindle with extra large tapered bearing and takeup adjustment collar. Head tilts to 90° in vertical position. Alloy stress-proof steel worm and

accurately cut worm wheel cut to close limits for accuracy. Ball bearing thrust and adjustable for end play. Complete with three index plates for dividing all numbers to 50 and even numbers to 100, except 96T. Index chart shows all divisions obtainable to 380. Right or left hand models.



Model BP 11" Swing for plain milling machines. Shipping weight, 140 lbs....

\$199.54



Fully Universal for complete indexing and spiral cutting.

Shipping weight, 190 lbs.

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Send for complete catalog giving prices and specifications on these quality, low-cost L-W Products



L-W CHUCK COMPANY

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Technician is shown using dye penetrant method for checking swaged cable littings.

ing swaged cable fittings. The accompanying illustration shows a technician applying the red dye penetrant to the swaged end of a cable fitting. After a 5-minute penetration interval, the dye is removed and a white developer applied. Any cracks present in the fitting are readily revealed as scarlet

lines on a white background.

Using Dy-Chek in this manner for the inspection of swaged fittings, the shop has discovered flaws too small

to detect under a magnifying glass. Although this particular shop applies the Dy-Chek materials by brushing, they can also be applied by dipping or spraying. These materials are marketed by the Dy-Chek Company, a division of Northrop Aircraft, Incorporated, Hawthorne, California.





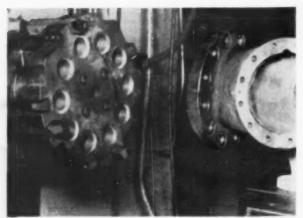
A cost conscious restaurateur actually employs an Ames Thickness Measure to hold pie crust thickness to a uniform standard, thereby cutting down raw material waste, lowering fuel costs and assuring top quality pastry day in and day out. This unusual solution to a measuring problem is illustrative of the creative thinking of Ames engineering and design department. They'll tackle any measuring problem you may have and come up with a sound answer that will improve your quality control. Ames has built gauges to measure the thickness of potato chips, soap flakes, enamel on teeth, as well as gauges that check the sway of buildings, the stretch of bolts plus many others that solve successfully unusual and difficult applications. If you are puzzled and want an economical answer to a measuring problem, send it to B. C. Ames today.



Ames No. 1 Dial Comparator — measures objects up to 2" in cross section. Adjustable table with positive locking screw. Height 9½", weight 4 lbs., Dial Indicator graduated .001", with .250" range.

Representatives in B. C. AMES CO. 29 Ames Street principal cities. B. C. AMES CO. Waltham 54, Mass.

Mfgr. of Micrometer Dial Gauges • Micrometer Dial Indicators



Fly-cutting head equipped with standard lathe tools is used to machine turbine part in General Electric plant

Lathe Tools Used in Fly-Cutting Head to Machine Turbine Part

IWO-PASS milling of a turbine part with a conventional 14-blade cutter has been reduced to a one-pass

operation through the use of a simple step flycutter at the Fitchburg. Massachusetts plant of General Electric Company's Turbine Division. On this operation, the use of a 14-inch diameter fly-cutter incorporating four stand-

ard 1-inch Carboloy lathe tools in an old fly-cutting head has also reduced tool grinding and resetting costs.

Used in a Sellers horizontal mill with a 5-inch spindle driven by a 15 h.p. motor, the step cutter removes 1/2

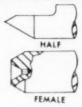


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Our new heat process results in a hardness of the high speed steel to such a degree that the center will outlast any other make and assure hairline precision, day in and day-out.-Carbide inserts especially selected for maximum abrasive wear resistance.

The obvious savings in time, money and replacement justifies use of RED-E centers. Write for Bulletin,

**CENTER Specialists Since 1908** 





540 Ironiston Ave.

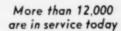
Bridgeport 5, Conn.

#### A PREDICTION for 1951:

# **Bridgebort**

#### TURRET MILLING MACHINES

will continue to win ever-widening acceptance



Since announcing the new Bridgeport 1 HP Head less than two years ago, these higher capacity machines with their recently developed attachments have been moving into metal working shops in a constant stream. Tool rooms, die shops and production lines are taking advantage of the greater versatility, capacity and convenience available to speed up the handling of larger, more difficult work.

Bridgeport Attachments are adaptable to machines already in service as well as to the higher capacity, 1 HP head, thereby making it possible to increase the productivity of "Bridgeports" wherever it is desired to do so.

It will be to your advantage to ask for more detailed information.



#### MILLING MACHINE VISE

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Available in two types: Heavy duty (left) and light duty (right). The heavy duty attachment is made in two sizes and will mill and drill at right angles. It fits both the Master and the 1 HP Bridgeport heads. The light duty type is designed for milling and drilling of natrow, deep molds and cavities.



#### No. 2 BORING HEAD

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inch of material, the lathe tools being arranged so that the cut is broken up into four ½-inch steps. No operating difficulty has been experienced in taking the entire cut in one pass, whereas the former cutter frequently stalled while taking the cut in two passes. The fly-cutter also produces a good finish, and the lathe tools require sharpening only once every eight hours. The radial depth of the slots in

the fly-cutting head progresses 0.050 inch per slot so that each tool cuts a separate circular track.

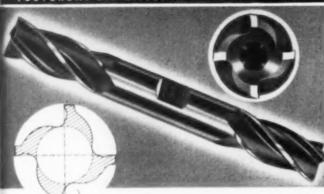
#### Training Films

"Speaking of Safety," a new series of six training films showing supervisors and foremen how to address and conduct meetings, has been announced by the National Safety Council.

Film No. 1 in the series is entitled "The Power of Speech." It lists occasions when foremen and supervisors may be called on to make a speech and explains the difference between a formal and a working speech. It also discusses the purpose of a speech from the audience and speaker standpoints.

Film No. 2.
"Butterflies in Your Stomach," explains physiological reactions that cause stage fright and shows how to overcome them. Film No. 3, "The Key to Good Speaking," outlines four accepted methods of preparing a

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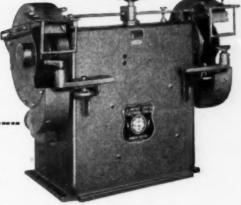




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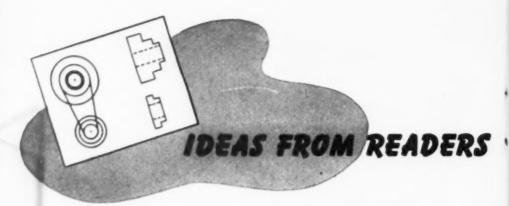
speech. It also shows, step by step, how to prepare a typical safety speech using the recommended method. Film No. 4, "On Your Feet," explains what to do physically when making a talk. It shows how to stand, the purpose of moving around and how to do it effectively, what to do with your hands, and where to look.

Film No. 5, "Now You're Talking," discusses actual speech making. It covers vocabulary and phrasing of ideas, how loudly to talk, and the speaker's attitude. It also shows how friendliness, sincerity and enthusiasm can make a speech a success. Film No. 6, "Ring the Bell," shows how to get and hold the attention of an audience. and how to illustrate a point by telling a personal experience, a humorous story or by comparisons. It also shows how to "break the ice" and explains the value of demonstrations, scale models or mockups, films, still pictures, graphs, charts, and diagrams.

The films are standard 35 mm. sound slide types with 16-inch records, 33 % r.p.m. About 13 minutes is required for the showing of each film. One side of the recording uses the 30-50 low frequency signal; the other side uses the standard audible signal for advancing the film manually.

Single sets of the six films, packaged in a leatherette case containing a leader's manual, are offered to members of the National Safety Council, 425 N. Michigan Ave., Chicago 11, Ill., at \$100 each. In quantities of from 2 to 9 the sets are \$95 each. Sets of 10 or more are \$90 each. Single copies of individual films in the series are \$18 each. In quantities of from 2 to 9, individual films are \$17 each. Sets of 10 or more individual films are \$16 each. Prices to non-members of the Council are double those listed.





#### Inexpensive Indenting Die

By W. M. HALLIDAY

A FTER being deep drawn from lightweight soft annealed brass sheeting, the shell shown in Fig. 1 was indented on the inside surfaces so as to produce four raised boss projections on the exterior as illustrated.

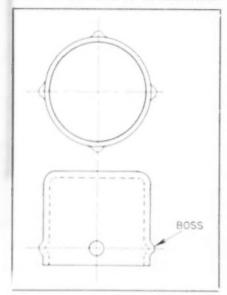
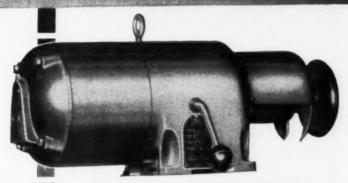


Fig. 1—Drawing of brass shell with boss projection on sides produced with indenting die shown in Figs. 2 and 3

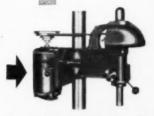
Conical in shape, these bosses had to be equally spaced around the periphery of the part and also located on the same lateral center line relative to the solid end portion of the shell. The bosses were reproduced merely by bulging out the wall metal a slight amount, at the respective points, so that the internal diameter of the part was pressed outward the requisite distance to form a raised projection on the external surface. Large quantities of these drawn shells were handled in this manner, and to ensure their economical production, it was essential that the indenting or boss-forming die used be of the simplest character, yet very fast working.

Figures 2 and 3 illustrate the unusual design, construction, and operation features of the indenting die which permitted all four bosses to be formed at a single stroke of the punch and press ram. Referring to Fig. 2, the die comprises a cast iron bolster, A, through which four holes are accurately bored to afford anchorage for four cylindrical guide posts, B. Each of these posts is reduced slightly in diameter on the portion fitted into the bolster holes. At the opposite end a head portion, C, is provided to serve

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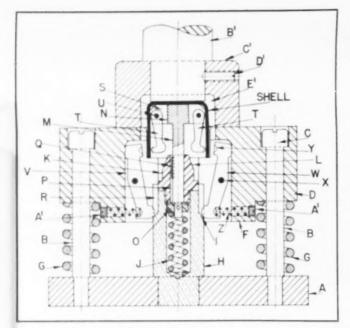


Fig. 2 — Drawing of indenting die showing relative positions occupied by die elements when punch has descended a short distance to bear against shell

the manner shown and press the die block upward against the heads, C, of the posts to hold it in the loading, or non-indenting, position.

From the lower (spigoted) end, the die block **D** is bored out centrally between the guide posts for its entire thickness

so as to provide an easy sliding fit over the stationary cylindrical column, **H**, which is reduced in diameter at its lower end for a distance equivalent to the thickness of the bolster **A**, this portion being very tightly press-fitted into a hole provided in the bolster. The portion of the column normally projecting out of the bolster is made two different diameters, and at the junction of these portions a short conical cam

as a positive stop for the rectangular steel die block **D**, which is arranged so as to slide freely on the long parallel portions of the four guide posts. The lower end of the die block is machined to form a raised circular spigot, as shown at **F**. The outside diameter of this portion is made sufficiently small to allow ample working clearance between the spigot and the stiff coiled compression springs **G**, which are slipped over each guide post in



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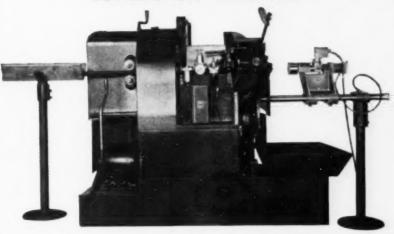
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is provided as shown at I. The angle of inclination employed on this cam portion is 60 degrees.

From the upper end, the column is bored out concentrically for a sufficient depth to accommodate the compression spring J. The upper end of this hole is internally threaded for a short distance to receive the nosepiece K, which, beyond its threaded shank is made with two different outside diameters. The largest diameter is identical with the outside diameter of the column. The extreme end of the smallest diameter portion is machined at a 60-degree angle so as to form the conical cam portion L.

The nosepiece is bored out concentrically and parallel to receive the cylindrical shank **M** of the bearing disc **N**, the shank having a free-sliding fit in the nosepiece. The lower end of

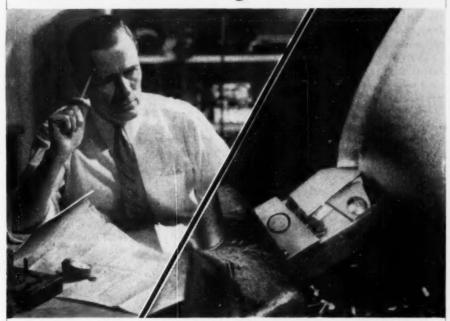
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the shank M is reduced in diameter and a small stop collar, O. is fastened thereon by means of a small pin passing centrally through both members. The spring J bears against the end of this collar, thereby tending to force the bearing disc in an upward direction out of the column; however, the amount of movement thus imparted to the disc is controlled and limited by the collar making contact with the end face of the nosepiece K situated within the bore of the stationary column. To prevent rotational movement of the disc relative

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to the column and nosepiece, a keyway. P. is provided along one side of the hole in the nosepiece. Sliding freely within this keyway is a small feather key, Q. seating in a groove machined on the side of the shank M.

The hole machined through the center of the die block D is counterbored on the lower end, as shown at R, to provide a slip fit over the major diameter of the central column. The opponite end of the hole in the die block



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is also counterbored to form a cylindrical housing or well into which the shell component can be easily inserted. The mouth of this counterbore is well chamfered or radiused to enable a shell to be readily placed in position.

The head portion of the bearing disc N is cylindrical, having an outside diameter about 0.010 inch less than the internal diameter of the shell component to permit the latter to be easily slipped over the disc, which is amply chamfered on the end face. The head portion of the disc is provided with four slots, as shown at S, which are equally spaced around the periphery of the disc and extend for a substantial distance toward the center. Four indenting arms, T, all exactly the same shape and size, are located in the slots, the arms being arranged so as to swing freely therein on the fixed fulcrum pins U which, in each case, pass crosswise through the disc at the relevant slotted portions.

The indenting arms are substantially L-shaped. The lower short horizontal portion is provided with a conical point at the end farthest from the column H. The size and shape of this conical portion is determined by the internal shape of the boss to be formed in the wall of the shell component. The opposite end of the horizontal portion



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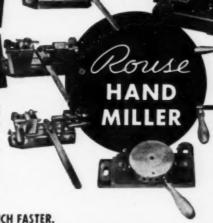
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2214 N. WAYNE AVE. CHICAGO 14 50 YEARS OF SERVICE TO INDUSTRY of each arm is rounded in the manner shown.

Four parallel sided slots are also machined in the die block D, as shown at V. These slots extend from the lower (spigoted) side for a major portion of the thickness of the block and are located so as to coincide with the four arms T. In each of the slots V is a steel rocker arm, W, which is fulcrumed therein upon a laterally disposed pivot

pin, X, situated in a cross-drilled hole in the die block. Each rocker arm is made of sufficient length to ensure that the conical recess Y machined in the upper side face is exactly central in each plane with the conical point formed on the end of each swinging indenting arm T. At its lower end, each rocker arm is provided with a semi-spherical raised boss which engages the conical cam portion I formed ad-

jacent to the largest diameter portion of the stationary column H.

In order to ensure that each rocker arm is held in the open position, a small spring, Z, is mounted in a hole in the spigoted portion of the die block. One end of this spring bears within a shallow hole drilled in the end of each rocker arm, and the opposite end of the spring bears against a fixed threaded plug. A', screwed into the end of the hole in the die block. To prevent the rocker arm from being pushed too far over by this spring, the upper end of the arm is arranged to bear against the base of the slot V in the die block.



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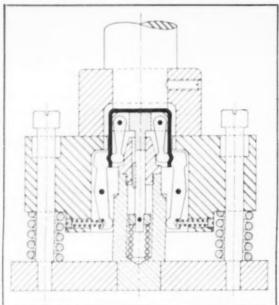


Fig. 3—Drawing showing positions occupied by die elements when punch has reached bottom of its stroke

The punch B', is merely a plain cylindrical rod, the lower end of which is reduced slightly in diameter to accommodate the collar C', this latter member being held securely in place by means of the screw D' which threads down into a dimple in the side of the punch. As shown at E', the collar C' is recessed out at the lower end of its bore to a sufficient diameter to afford ample clearance for the shell component, after the bosses have been produc-

ed thereon. The collar is positioned on

the punch so that it makes contact with the top face of the die block at exactly the same time that the end of the punch bears on the solid end face of the shell component when properly situated in the housing well in the die block.

Figure 2 depicts the relative positions occupied by the respective elements of the die when the punch has descended a short distance so as to bear

against the shell. After the punch has reached this position, its further descent causes the die block and the shell to be depressed simultaneously against the action of the springs G. As soon as the die block is depressed from the position indicated in Fig. 2, the rounded ends of the rocker arms W engage with the conical cam portion I on the stationary central column H. Further downward movement of the die block causes these lower portions of the four rocker arms to ride

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up the inclined surface of the cam, thereby pivoting the arms outward at their lower ends about the fixed pivot pins X. As a result, the upper portions of the rocker arms containing the conical recesses Y are moved inward a commensurate amount to bring the latter into the correct operating position.

Further descent of the punch and die block then brings the rounded ends of the swinging indenting arms T into engagement with the conical cam L on the end of the nosepiece K, thereby causing the arms to be forced outward and, in so doing, to bulge the wall metal of the shell component into the recesses Y in the now correctly positioned rocker arms. Figure 3 shows the positions occupied by the die elements when the punch has reached the bottom point in its working stroke.

When the punch has ascended a sufficient distance to allow the rocker arms to make contact again with the conical cam I, the small springs Z come into action in such a manner as to move the arms in an opposed radial direction to each other, thereby withdrawing their upper portions containing the conical recesses Y away from the formed sides of the shell and affording clearance for the shell when it is removed from the die block at the completion of the upstroke of the punch.

Also during the ascent of the punch, the arms T pass down the inclined faces of the cam L, thus enabling them to withdraw themselves, partly by their own weight, from the workpiece. The normal resilience and springiness of the sides of the shell also assist in removing the arms.

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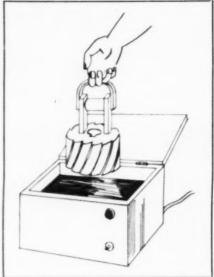




#### Magnet Facilitates Dipping of Sharpened Tools in Protective Coating Material

By H. G. FROMMER

Many grinding rooms employ some type of plastic coating material for protecting the edges of newly sharpened tools. To use, the



Sketch showing use of magnet in dipping newly sharpened tool in protective coating material

plastic material is usually heated in a small electric melting device and the tools to be protected are given a short dip therein. The plastic coating hardens almost instantly, providing the cutting edges of the tools with full protection.

In dipping tools with long handles, little difficulty is experienced in submerging the sharpened edges in the protective material; however, in dipping tools such as shell end mills,



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counterbore cutters, and the like, which must be covered completely, wire hooks, strings, or pliers are usually used, with a resultant loss of time, as well as added grievance of burned fingers. By using a strong, permanent magnet in a manner as shown in the accompanying sketch, such tools can be easily held for dipping without discomfort or loss.

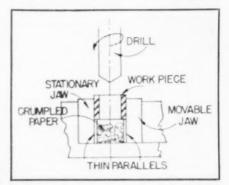




#### Parallel Spacer

By F. A. ADAMS

PREQUENTLY, in toolmaking practice, an occasion arises where the toolmaker must drill a large diameter hole through a piece, leav-



Sketch showing use of ball of paper for spacing parallels in vise during drilling of large hole in small diameter workpiece

ing a rather thin wall section on each side of the hole as shown in the accompanying sketch. In performing the drilling operation, thin parallels must be used to support the work in the vise. These parallels, due to their thinness, have a tendency to fall over and interfere with the drilling operation.

In order to eliminate this difficulty, a simple but effective spacer can be made by crumpling up some paper into a ball and inserting it between



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51	.055	120	56	3-32	180
52	.055	150	57	4-32	180
53	.040	180	58	7-32	150
54	.030	200	59	9-32	150
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Write for samples and prices

E. C. MITCHELL COMPANY
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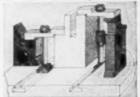
Thrust Bearings Specialists For Over 30 Years

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TOOL AND DIE MAKERS—EST. 1926
315 N. Main St., Englewood, Ohio
Phone ENG 59 8 miles north of Dayton, O.



Automatic soldering table built by Automatic Methods, Inc., Newark, N. J. uses air pressure mixed with city gas for maximum efficiency and economy of operation

the parallels, as shown in the sketch. The ball of paper holds the parallels in an upright position and will not injure the drill when it comes through the workpiece.

Air Pressure Cuts Costs in Automatic Soldering Operations

By IRA S. ROBERTS

A UTOMATIC Methods, Inc., Newark, N. J., manufacturer of precision aircraft parts, has developed a unique automatic soldering process. A circular table, 8 feet in diameter holding 8 to 12 pieces of work to be soldered along its periphery, revolves in given increments. One set of gas

burners, traveling with the table, preheats the part to be soldered and another stationary set of burners provides the final fusion heat. After preheating, the traveling burners return to pick up another part. Using two operators for loading and unloading operations, this table has provided for the production of as many as 125 finished pieces per hour.

Air under 5 to 10 lb. pressure is mixed with ordinary city gas to bring the flame temperature up to about 1,300 deg. F. By preheating the work, structural deformity is minimized—an

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operation and added smoothness provided by Greaves Silent Bakelite Gears. . You'll marvel at their great strength to carry big power loads . . . their remarkable ability to successfully operate com-

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Time . . . Money . . . Labor! We also make silent gears of rawhide and Fabriol.



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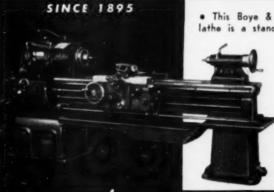
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#### FOR 55 YEARS BUILDERS OF TOP QUALITY MACHINE TOOLS



. This Boye & Emmes heavy duty 16-inch lathe is a standout in production perform-

ance. Higher speeds and a greater number of thread, lead and feed changes are now obtainable. When buying an engine lathe, check the Boye & Emmes dependable line and learn about the advantages this lathe offers. Complete catalog covering 14" thru 32" available on request.

#### THE BOYE & EMMES MACHINE TOOL CO.

Heavy Duty Lathes - Sizes 14" through 32"

125 CALDWELL DRIVE

CINCINNATI 15, OHIO

important factor in close tolerance aircraft parts. Air pressure and city gas are simple and economical to use for soldering operations. A single Leiman air pump provides adequate air pressure for several tables.

#### Welding Film

Air Reduction has announced the completion of a Kodachrome sound motion picture which tells the story of the Aircomatic Process for welding aluminum, stainless steel, bronzes, and Monel. This film, in an expository manner, explains the nature, character, and uses of the processes. One of its outstanding features is the unusual close-up photography of the Aircomatic arc. Through the use of special filters and camera techniques, actual deposition of weld metal and

much detail in the arc are brought to the screen. Other aspects of the process are explained by means of animation and demonstration.

The manual and automatic welding of such metals as aluminum, stainless steel, bronze, and Monel are covered in considerable detail, both in demonstration and laboratory sequences, as well as in actual production work. Showing time for this 16 mm. two-reel film is 21 minutes. The film is especially designed for showing to nontechnical groups and is suitable for presentation before such varied groups as purchasing agents' associations, foremen's meetings, and technical society meetings. Complete information regarding the film, including arrangements for showing, may be obtained by writing to Air Reduction, 60 E. 42nd St., New York 17, New York.



WHAT are believed to be the largest double-ported control valves ever built have recently been completed by Kieley & Muller, North Bergen, N. J. According to K & M engineers, the construction of these giant control valves, which have 36-inch pipe connections, involved some very delicate engineering. Despite their size, the huge valves had to fully open and fully close within one second and provide absolutely tight shutoff. Furthermore, the guiding problem for the valve plug was extremely intricate as installation requirements made it necessary for the valves to be on their sides. This problem was solved by equipping the guide posts with linear-type roller bearings which permit friction-free movement of the valve plug between open and closed positions. The valves are now being used in one of the nation's leading oxygen producing plants.

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# EW MODEL 2D.4 PANTO-ENGRAVER

A precision two-dimensional engraving machine, bench or floor model for large metal or plastic panels, signs and name plates; steel stamps and dies or any product requiring production or precision engraving. Will engrave to center of 30 inch wide panels. Pantograph reductions from 1:1 ratio to infinity. Collet capacity 1/10" to 1/4" diameter. Six cutter spindle speeds from 5,000 to 14,000 R.P.M. Precision ball bearings throughout. SEVERAL OTHER MODELS AVAILABLE FOR ENGRAVING.
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EQUIPMENT MARKING

## News of the Industry

#### Large Boring, Drilling and Milling Machine Destined for Western Europe

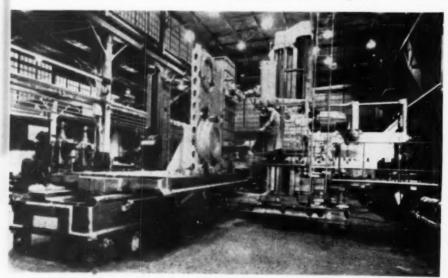
An outstanding example of machine equipment destined for Western Europe under the Marshall Plan is the large horizontal boring, drilling and milling machine shown herewith, which was built by the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis., for the Renault Motors Company near Paris. The machine is equipped with General Electric 20, 10, and 3 h.p. electronic amplidyne feed drives and its various motions are controlled by a G-E three-dimension electronic tracercontrol system. This tracer is designed to automatically machine steel dies to

the exact shape of wooden models.

In the illustration, the tracing head mounted directly above the milling spindle is shown following the surface of a wooden pattern while the milling cutter below reproduces the same form in the die steel. The electronic amplidyne position-regulating systems are coordinated to simultaneously control the feed motions of the machine, moving in mutually perpendicular planes.

#### Dillon Occupies New Quarters

W. C. Dillon & Co., Inc., formerly of 5410 W. Harrison St, Chicago, has announced the completion of a new



Large horizontal boring, drilling and milling machine built by Giddings & Lewis Machine Tool Company for shipment to Renault Motors Company near Paris



New general office and laboratory building of W.C. Dillon & Co., Inc., Forest Park, Illinois

general office and laboratory building at 1421 S. Circle Ave., Forest Park, Ill. Approximately 15,000 square feet of working area are available in the new building, which is being equipped with specialized machines and calibrating equipment. In addition, the building houses a complete and elaborate dead weight testing setup. A new electronics department is engaged in

communications and carrier research.

Active members of W. C. Dillon and Company include W. C. Dillon, Sr., president; E. I. Dillon, R. E. Dillon, and R. R. Dillon, vice presidents; G. P. Dillon, chief engineer; W. L. Dillon, electronics engineer; W. C. Dillon, Jr., thermometry engineer; Eli Ricker, assistant chief engineer; and T. E. Osetek, purchasing agent.



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cold pipe, conduit and heavy wall tube
BENDING MACHINES
Fast... Simple... Dependable...

#### RADIANT HEAT BENDS in Standard Pipe

Fast . . . Accurate . . . Average bend takes only 10 seconds! Up to 180° bends . . . all sizes from  $\frac{1}{2}$ " to 2". Usual radiant heat bends for  $\frac{1}{4}$ " at 6" and 9" radii can be supplied. Only 7 parts. Occupies  $\frac{18}{3}$ " x 18" floor space.

Capacity 1/2" to 2" standard pipe . . . Minimum radius 5 times pipe diameter up to 180" . . . Maximum radius 13". Complete with rolls for each size pipe. Standard motor equipment 2 h.p.

Special radii supplied on request.

PIPE ETHDING MACHINE
COMPANY INC
Factory and Main Offices:
14 Furnace St., Pouliney, Vt.

#### Hughes Reelected President of Grinding Wheel Institute

Earl C. Hughes, vice president of the Bay State Abrasive Products Co., Westboro, Mass., was reelected president of the Grinding Wheel Institute at the annual meeting held recently in the Statler Hotel, Buffalo. The institute, which is composed of 29 of the leading grinding wheel manufacturers in the country, has played an important part in cooperating with its members in such functions as safety, research, and standardization of abrasive products in order to keep their industry abreast with all other industrial and technical progress.



Earl C. Hughes

PALMGREN Rotary, Index MILLING TABLE

Has 8" table, 360' movement and 4" cross feed travel. Adjusting wheels and dials graduated in degrees and thousandths. Slotted for bolting to table. No. 82 without rotary feed \$39.75. Write for Circular No. 354.

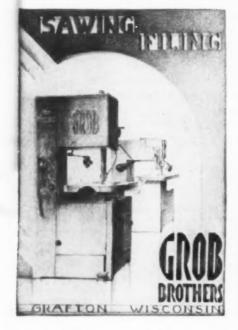
CHICAGO TOOL and ENGINEERING CO. 8399 South Chicago Ave. Chicago 17, Ill.

Mr. Hughes joined Bay State as executive secretary in 1936 after resigning his position as assistant sales manager of the abrasive sales division at Norton Company. In addition to being executive secretary, he is also vice president of Bay State, having been elected to that position by the directors early in 1950.

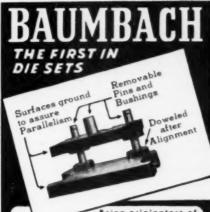
#### Changes in Executive Positions at Potter & Johnson Company

Clayton R. Burt, former president and former chairman of the board of the Niles-Bement-Pond Co., West Hartford, Conn., retired recently from the presidency of the Potter & Johnston Co., Pawtucket, R. I., a whollyowned subsidiary of the N-B-P Company.

Frederick U. Conrad, president and







Standard Die Sets naturally we are steps ahead in Design — Precision — Dependability and Economy. Baumbach Die Sets can be disassembled. The Leader Pins and Bushings can be used on other size Die Sets — reducing inventorying a lot of Die Sets. Castly machining time is also reduced. Learn all about Baumbach advantages before you buy. Write for circular.

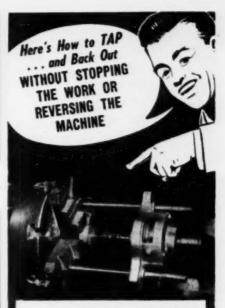
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EAU CLAIRE WISCONSIN U S A



The Errington Auto-Reverse Turret Lathe Tapping Head is a new tool, practical, time-saving, money-saving. In a turret lathe setup, as illustrated, it allows you to tap the hole and bock out the top without stopping the work or reversing the mochine. It's easy to operate: simply feed the tap into, and out of, the drilled hole while the work is turning in the one direction.

The new Tapping Head is a money-saver in this respect, too with the aid of a friction chuck, you can tap blind holes without any possibility of tap breakage.

An inquiry, based on your production problems, will bring full details, prices and delivery information. There's no obligation.

#### ERRINGTON AUTO-REVERSE TURRET LATHE TAPPING HEAD

can also be used on drift press work for production tapping. For this the Errington Head has a 2 to 1 reverse, and uses quide bars to hold and steady the case.

> Write for Complete Information

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Edward P. Gillane

general manager of Niles-Bement-Pond Company, which includes the Pratt & Whitney Division and the Chandler - Evans Division, succeeded Mr. Burt as president of the Potter & Johnston Company. Edward P. Gillane

was elected vice president and general manager of Potter & Johnston, with J. Potter Cunningham continuing as vice president and sales manager.

#### Chapters Plan Program for Materials Handling Conference

Sixteen chapters of the American Materials Handling Society will par-

ticipate directly in the program planned for the Materials Handling Conference which will be held concurrently with the National Materials Handling Exposition at the International Amphitheatre, Chicago, April 30 to May 4, inclusive. The society's membership is composed principally of users of materials handling equipment.

The society is sponsoring the conference and the Material Handling Institute is sponsoring the exposition. General chairman of the conference will be A. K. Strong, marine division, Columbian Rope Co., New York. Serving with him on the executive committee will be Donald W. Pennock, factory engineer, Carrier Corp., Syracuse, N. Y., who is society president, and Irving M. Footlik, materials handling consultant, Chicago, society treasurer.



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Catalog, plus details on Free Engineering

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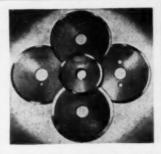
Single or multiple diameter pieces. High in quality—accurate to blueprint—prompt service. In position to handle large or small lots.

Inquiry invited.

## CENTERLESS

GRINDING CO.

# FASTER



## PIPE and TUBE CUTTING ... More Cuts per Wheel

Continental Steel Cut-Off Wheels, available for all make, of rotary cut-off machines, provide increased production . . . at modest cost.

Discs 7" dia., 1," and 4," thick carried in stock.
Bore 1,", 1,1,", or 14,". Special sizes made
quickly.

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CONTINENTAL MACHINE CO.



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  - · 4 rows of precision ball bearings
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    - · Write us for circular

## QUADRO

- Precision
  - LIVE CENTERS

## PRECISION IN EVERY TURN

(GUARANTEED ACCURACY ± .0001")

DAKON-

TOOL AND MACHINE CO., INC.

THE BROADWAY BROWN I'N I

Allegheny Ludlum Officers Elected

The election of Edward J. Hanley as president and Clark W. King as executive vice president of Allegheny Ludlum Steel Corporation has been announced by H. C. Batcheller, chairman of the board, following a meeting of the board of directors. Mr. Hanley, formerly executive vice president, succeeds E. B. Cleborne, who announced his resignation effective December 31, 1950. Mr. King, formerly

vice president and treasurer, succeeds Mr. Hanley and will retain the position of treasurer. Mr. Cleborne will continue to serve the company as a director and vice president.

The retirement on December 31, 1950 of Frank B. Lounsberry as vice president and technical director and the appointment of W. B. Pierce, formerly manager of the company's sales development and engineering service department, as technical director were

announced at the

same time. Following the directors' meeting, Mr. Batcheller presented the Allegheny Ludlum Merit Award to Messrs. Cleborne and Lounsberry. Mr. Cleborne's award was made for his leadership and counsel in improving quality and reducing costs during a period of most rapid growth in the history of the company. Mr. Lounsberry won his award for development of processes whereby stainless steel could be produced more economically. The award consists of "The President's Medal." a citation from the directors and \$1000 cash.





**Pinion Shafts** Upper Drives Lower Drives Universal Joints Arms and Brackets Spindles Bracket Spindles

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Morse Taper Adapters With Without Set Screw Slots

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Consult SEIBERT engineers before retooling or replacing parts on multiple spindle machines. (New Low Prices)

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**Spacing Collars** 



Designed for accurate spacing of side milling cutters, gang milling and other multiple milling set-

Collar may be adjusted by thousandths by merely loosening cutter arbor nut. Also quarter - thousandths adjustments.

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THICKNESS

DAYTON ROGERS MFG. CO.,

MINNEAPOLIS,

#### New Crobalt Plant Handles Increased Volume

L. D. Burnell, president, has announced that Crobalt Inc., manufacturer of non-ferrous cast-alloy cutting tools and wear-resistant alloys, has recently built and moved into a larger plant on a 1-acre tract at 2800 S. State St., Ann Arbor, Mich. The new building is the first of several units to be erected, and provides the space required to handle an increased volume of business resulting from improper products and production methods. It is designed and equipped for maximum efficiency in production, research and development work.

#### Appointed General Manager of Pivot Punch Division

Edmund J. Klonowski has been appointed general manager of the Punch Division of Pivot Punch & Die Corp.,

North Tonawanda, N. Y., under an expansion plan which has involved doubling the size of the plant and tripling its production. Only 32 years of age, Mr. Klonowski is one of the youngest general managers in the punch



Edmund 1. Klonowski

industry; however, he has had 14 years of experience in die designing, having started his career with the Crosby Company when he was 18 years old. In charge of die design at the Bell Aircraft Company during the last war, Mr. Klonowski added to his experience at the Wales-Strippit Corp., North Tonawanda, and the Struthers-Wells Corp., Titusville, Pennsylvania.

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#### WITH EXTRA ADVANTAGES!

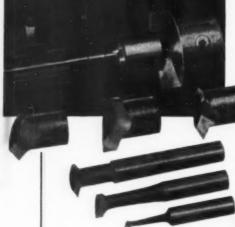
#### All styles

- for general boring
- for bottoming and facing
- for internal threading

Write for catalog

## R.B.TOOL Co.,Inc.

41 East Hartsdale Ave



Has only to be resharpened by grinding top face.

The boring tools are made of superhigh-speed steel or carbide tipped.

# STOP DUSTS with DUSTKOP

22 different Dustkops — 300 cfm to 10,000 cfm available from stock.

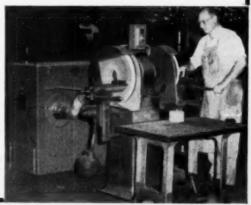
- ... dusts from,
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- . . . any industrial dusts.

Send now for new Catalog 605b.

Describe dust problem for recommendation by return mail; no obligation.

#### AGET - DETROIT CO.

207 Main Street Ann Arbor, Mich.





housings, etc.

Send parts for free grooving and production estimate This machine will slash grooving time and deliver continuous profitable production in your shop. It will pay to find out what it can do on your grooving jobs.

Write for Catalog.

Fischer Machine Co.

316 N. ELEVENTH ST. - PHILADELPHIA 7. PA.

Established 1900

#### Ralph J. Cordiner Elected President of General Electric Company

Ralph J. Cordiner has been elected as president of the General Electric Company to succeed Charles E. Wilson, named as chairman of the new Defense Mobilization Board, Mr. Cordiner, who has been associated with General Electric for 24 years and has served as manager of five of the company's departments during that

period, has been executive vice president and a director of the company since 1949, Mr. Cordiner's first position was on a parttime basis with the Pacific Power and Light Company. In 1922 he



Ralph J. Cordiner

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Rutland reworked or repaired cutting tools are guaranteed to give new tool performance at a fraction of the new tool cost.

Recutting \* repairing \* replacing Carbide tips.

Special tools from obsolete or standard tools, etc.

Coll or Write

Rutland TOOL SERVICE

1617 E. McNichols • Detroit 3, Mich. TWinbrook: 3-6240 was made commercial manager of a division of the company. His record was such that in less than a year he was offered a position with the Edison General Electric Appliance Company with headquarters in Portland. Five years later he became Northwest manager in Portland and in 1930 moved to San Francisco to become Pacific Coast division manager.

When the heating device section of the Edison General Electric Appliance Company was transferred from Chicago and consolidated with General Electric's Appliance and Merchandise Department at Bridgeport in 1932, Mr. Cordiner went with the section as manager and chairman of the management committee. Two years later he was appointed assistant manager of appliance sales, and in 1935 became manager of the radio division. A year later he was promoted to assistant

#### A REAL HELPING HAND

It's a help that die makers, tool makers, machinery builders and general machinists have long sought a more accurate and surprisingly faster way of transferring blind screw holes.

The Heimann Transfer Screw Set is a self-contained complete tool. No wrenches or pliers are necessary. Made in its to 1" diameters. Send for price list.



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RECLINABLE POWER PRESSES

Nammont Machinery Builders



Ideal for general stamping work . . . 4 to 100 tons capacity. Can recline to 40° with perfect safety.

Kalamazoo, Michigan

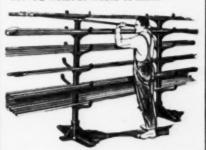
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# STOCK-ROOM SERVICE

The BROWN SECTIONAL RACK saves the time previously lost in end-hauling each bar of stock its entire length from the old-style. closed-side Rack, the Brown Rack requiring but a few inches of side movement. Each length, width and thickness of stock is displayed in gold-fish visibility for instant selection. Workmen waiting for stock are served without waste of time.



Any time you require additional storage space, all you need do is add more units. If you want to relocate it at any time, you can do so quickly for it is unattached to the building.

It is a simple, durable article made of metal in five styles, It can't burn, warp, sag or twist; depreciation is practically nil. SEND FOR BULLE-TIN No. 26-B DESCRIBING

BROWN'S QUICK-SERVE RACKS

BROWN ENGINEERING CO.

120 N. THIRD ST. READING, PA.

manager of the Appliance and Merchandise Department and in January 1938, succeeded Mr. Wilson as manager of the department.

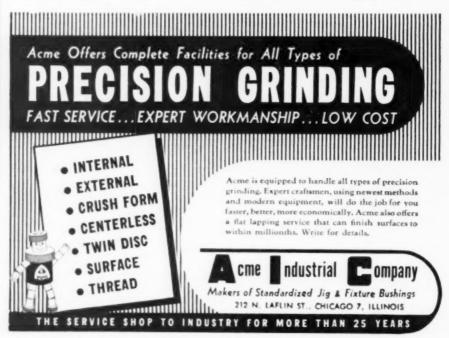
In 1942, Mr. Cordiner entered government service as director general of war production scheduling and vice chairman of the War Production Board. He rejoined General Electric as assistant to the president in 1943 and was elected vice president in February 1945.

#### Wellman Engineering Purchases Anker-Holth

The Wellman Engineering Co., Cleveland, Ohio, has purchased the property and business of the Anker-Holth Mfg. Co., Port Huron, Mich. Established in 1904, the latter firm employs approximately 75 skilled workers for the manufacture of a complete line of hydraulic and airoperated cylinders, chucks, collets, air valves, and accessories.

Anker-Holth will now become the Anker-Holth Division of the Wellman Engineering Company, and the division headquarters will remain in Port Huron, Michigan. J. C. Hodge, executive vice president of Wellman, will supervise the operation of the newly acquired division. W. L. Komph will continue as manager of sales and engineering and F. J. Theisen as plant manager.

For over fifty years, Wellman Engineering has specialized in the construction of steel mill equipment and machinery for handling heavy bulk materials. Products include car dumpers, gas producers, charging machines, ore and coal bridges, cranes, hoists, buckets, and other equipment.







Threaded Plastic Balls Oval or Round

Clamping Handles



Cast Iron Hand Knobs, Three Styles
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ALSO SCREW CLAMPS, MACHINE VISES, FIXTURE UNITS, MAGNETIC BLOCKS AND ROTARY TABLES.

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# Removable and interchangeable lindex Plate Three Sizes 12"-15"-18" Also Wormwheel Operated Rotary Tables 9"-25" See your dealer or write

See your dealer or write for Catalog No. 14

Troyke Mfg. Co. Inc.



### SAWMASTER HACK SAW



LOW PRICED

### **PORTABLE**

SELF-CONTAINED

READY TO WORK

Angle Cutting Vise

**STURDY** 

**ECONOMICAL** 

Write for Bulletin No. 300

MILLER-KNUTH MFG.CO. OMAHA, NEB.

#### New Plant to be Built at Butler, Pa.

Purchase of a site for the erection of another link in its chain of plants throughout the country for the manufacture of oxygen and nitrogen, together with related facilities, has been announced by H. R. Salisbury, president of Air Reduction Sales Company, a division of Air Reduction Company, Incorporated. The new plant and facilities will occupy a tract of land covering about 23 acres in Butler, Pa., and are expected to be in operation the latter part of 1951.

This new unit, capable of producing very large quantities of oxygen per day, both liquid and gaseous, will also produce liquid and gaseous nitrogen and other gases extracted from the air. Most of its production will be used to fabricate materials required for the expanding defense effort.

#### Elected Director of Rockford Machine Tool Company

Kenneth M. Allen, 3320 California Drive, Rockford, Ill., was elected a

director at the annual meeting of the board of directors of the Rockford Machine Tool Co., Rockford, Ill., manufacturer of Rockford hydraulic shapers, planers, slotters, shaper - planers and Rockford economy lathes. Mr. Allen has been associated



Kenneth M. Allen

with the Rockford Machine Tool Company since the year 1935 and will continue to serve the company in his present position as sales manager.



### BARKER

### (Two-Jaw or Three-Jaw) WRENCHLESS CHUCK

will pay for itself in 60 to 90 days on production schedules by giving MORE parts per hour at a LOWER cost per part. Most round parts can be set in the Barker Wrenchless Chuck without stopping the machine. It saves time, helps speed up production, and cuts spoilage where the run is continuous on turrets, engine lathes, cutting off machines, drill presses or any other type of chucking machine. The Barker Chuck shown here, replacing an ordinary 3-jaw chuck, jumped production from 18 to 24 pieces per hour. It can do it in your plant too.

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- Chuck Division THOMAS HOIST CO.

28 S. HOYNE CHICAGO 12

### SAFETY RADIUS DRESSER



• Key tool men are safe from sparks and flying grit because this dresser works beneath the wheel, and the wheel guard can always be left in place.
• Capacity: concave, 2½"; convex, 1½". Maximum wheel size 8".
• Overall dimensions: 6" x 6" x 3" wide. Weight 16 lbs.
• Price with diamond \$99.00. Send for Catalog.

. FOR 10 DAY FREE TRIAL MAIL AD TO:

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49 Park Place, N.Y.C. 7

### MARK IRON, STEEL and CARBIDES





Original Electric Etcher. Thousands in Daily Use

Mark hardened parts, tools, dies, gages and fixtures of any ferrous metals including the hardest alloys and carbides—quickly—plainly. • Three sizes to meet all requirements.

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### MAUSER-TYPE PRECISION VERNIER CALIPERS\_\_\_\_

MADE BY MESSZEUGBAU OF BOLL/OBERNDORF



NOTE: The well-known Mauser Caliper factory has been dismantled by order of the occupation authorities and many of the Mauser technicians have re-established the production of these calipers under the name of Messzeugbau. Highest quality and precision—in the Mauser tradition—are therefore guaranteed.

### INTER - CONTINENTAL TRADING CORPORATION

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NEW YORK 6, N.



Carborundum Establishes Marketing Department

The Carborundum Co., Niagara Falls, N. Y., has established a Marketing Department under the direction of (Seated left to right)
Arthur W. Cowles,
advertising manager;
Frederick T. Keeler,
director of marketing;
Lewis P. Mercer, promotion manager;
(standing left to right)
E. Dent Lackey, public relations manager;
Arthur Batts, Jr., manager of commercial
research

Frederick T. Keeler, according to an announcement by Fred W. Bonacker, general sales manager of the company.

Designed to strengthen and coordinate the functions of marketing, the new department brings together all related staff functions of marketing, including market research, advertis-

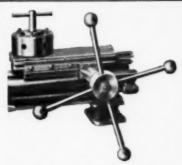
### PRECISION BUILT MACHINIST VISE

Enclosed design prevents chips and dirt from entering internal parts. The balanced motion of a fine threaded spindle, moving freely in an ingeniously anchored sleeve type nut, eliminates dead motion and strain on moving parts. Head moves in precision broached keyway. Complete size range of bench and combination pipe vises. Before you buy, write for our descriptive catalog and give us the name of your preferred distributor.

WILTON TOOL MFG. CO.
925-G Wrightwood Ave. Chicago 14, Ill.

WILTON
THE FINEST NAME IN VISES





### LYNN is on the Job

The same, but improved, Lynn Replacement Turrets as used during the last war, are again available. Note the BT-2 Heavy Duty, Self-Indexing, Conversion Bed Turret with Pilot Wheel, as illustrated. LYNN conversion Turrets are working on Engine & Turret lathes of all makes. We build to fit your needs.

Machine Tool Division,

LYNN MANUFACTURING CO., Inc.

1121 S. Seventh St., Minneapolis, Minn.



• Pioneers in the riveting field. Head rivets from smallest to ¾" diameter, either by noiseless spinning or vibrating hammer method.—Sizes to meet all needs.—Types include Vertical and Horizontal Multiple Spindles. Write for literature—and don't forget to send samples.

THE GRANT MFG. & MACHINE CO. 96 Silliman Ave. Bridgeport 5, Conn.



Every shap needs a SHOPLIFTER. Saves men, saves materials. Besides handling heavy dies, the SHOP-LIFTER can stack drums and boxes, unload street trucks, pick up skids and be used as an adjustable height table.

All steel, are welded frame. Easily operated hoist unit with automatic brake, safely holds load at any height.

	Type D, hand operated	\$254.00
	1000 pound capacity Type DX, hand operated	\$490.00
	Type DX, hand operated	
	Floor lock to hold machine steady \$16.00 extra for 500 pound sizes \$24.00 extra for type DX models	
ist	prices, F.O.B. Chicago, subject to current of	

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ing, sales promotion, and public relations. A staff organization of the Sales Division of the Marketing Department will service all domestic and Canadian marketing operations of the company.

Mr. Keeler, graduate of Hamilton College and Harvard Graduate School of Business Administration, has been with the company since 1943, serving as director of commercial research prior to his appointment as director

of marketing. Arthur Batts, Jr., formerly assistant director of commercial research, will be manager of that department and handle market research and sales forecasting. Arthur W. Cowles, advertising manager, formerly in the advertising and sales promotion divisions of General Electric Company's Apparatus Department, will be in charge of planning and administering advertising, and relations

with advertising agencies.

Lewis P. Mercer, formerly assistant manager of the hardware and automotive sales department, has been appointed manager of sales promotion. in which capacity he will supervise training for sales personnel and distributors and develop special sales promotion programs and materials, catalogs, industrial exhibits, and so on. E. Dent. Lackey, previously assistant director of industrial relations has been named public relations manager and will be responsible for community relations. press, radio, films, and company publications.

### LOCALITES for Better Light ON the Job

**Directs Light Exactly Where Needed** as Easily as Pointing Your Finger

**Designed Especially** for Machine Tools, and Work on Assembly and Inspection Benches



MODEL 3267-H-174

Overall length 3234". Three instantly adjustable joints. Flat oblong base for machine screw mounting.

L12 EACH in pkg. of 6 Single Units \$7.65 ea.

- Rugged Construction to stand strains and shocks • Instantly Adjustable with full swivel ball and socket joints
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- Reflector accommodates 100 watt A-21 medium screw base lamp
- · Wired Complete with switch socket and 8 ft. oil resistant cord

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of Localite models with various type reflectors, arms and bases for every industrial use.

THE FOSTORIA PRESSED STEEL CORPORATION FOSTORIA, OHIO

Localites are available through selected dis-

288



### RIVETING?



FAST RIVETING WITHOUT NOISE

Put your production jobs on Lintey Spinner Type Riveting Machines. No hammering! They spin rivet with twin rollers. In most cases the actual riveting time is one second per rivet, so that you can watch costs come down while noise is entirely eliminated! Direct Motor or Vee-Belt Driven. Bench or floor types.

Send samples of your work for free riveting, cost of equipment and true estimate on production.

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NIBBLING MACHINE

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Since 1885

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Cut grinding costs . . . with rugged QUEEN CITY Grinders

Queen City Grinders are built to stand up under the heavy work that pours through the shop daily. Noted for their durability, freedom from downtime and low cost. Queen City Grinders cut grinding costs to the bone. Order today a battery of these low cost grinders and eliminate "ganging up" around one lone grinder.

QUEEN CITY MACHINE TOOL CO QUEEN CITY
Machine Tool Co.
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Cincinnati 2, Ohio



#### Representation in Peru

For the intensification of commercial relations with Latin America, especially between the United States and Peru, Eduardo A. Chocano, Soc. Anon, Casilla 365, Lima, Peru, is placing at the disposal of manufacturers and export firms its sales organization and is prepared to act as buyer of Peruvian products for interested firms. The company is interested in representing, on a commercial basis,

various kinds of materials and equipment for the metal-working as well as many other types of industries. Manufacturers are requested to send catalogs, samples, price lists, agencies and sales conditions direct to the company.

#### Machinery Manufacturing Company Reorganizes as Diversified Metal Products Company

The Machinery Manufacturing Company, former builder of the Vernon

line of jig borers. millers, shapers, and tool and cutter grinders, has announced a reorganization under a new firm name of Diversified Metal Products Company, with manufacturing facilities located at 5125 Alcoa Ave., Los Angeles 58, Calif. At present, a development program is in process for precision machine tools which are in current demand, with full production scheduled for early February. Of special interest to former dealers and distributors of the Vernon line is the fact that administrative personnel of the new company remains much the same.



### For Operating Small Cylinders & Master Valves

Compact, sturdy construction precision engineered for high speed and long uninterupted heavy duty operation, Automatic valves have small, well protected solenoids for operating small cylinders and air and hydraulic master valves.

Reasonably priced—Attractive quantity and O.E.M. discounts. Write for bulletin.



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PIONEERS and SPECIALISTS in PILOT OPERATED SOLENOID CONTROLLED VALVES

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We manufacture a complete line of Woodruit keys in all standard sizes. These sizes range from as small as ½" x 1/16" to keys as large as 3½" x ½". All keys are carefully checked for burrs, slivers, etc. before being shipped to you. Only the finished tested keys are permitted to leave our plants.

We carry a complete stock of high quality, dependable keys. Send for our catalog for complete information on Woodruff keys, taper pins, machine keys, and machine

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### FOR GREATER HARDNESS TESTER ACCURACY Specify CLARK STEEL BALL PENETRATORS

• For dependably accurate hardness testing, every part of your testing equipment must be designed by experts. CLARK Hardened Steel Ball Penetrators are designed to give the most accurate possible results in the testing of soft metals such as unhardened steel, cast iron, brass, bronze, and similar metals and alloys. They are available in 1/16" and 1/8" diameters at \$5.00, and in 1/4", 1/2", 3/4" and 1" diameters at slightly higher prices. Specify CLARK Steel Ball Penetrators for more accurate "Rockwell" testing.



\$5.00 Each F.O.B. Detroit

INSTRUMENT, INC.

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Saarbarn Mich



### A.S.A. Issues Revised Edition of Standard for Drawing

A revised edition of the American Standard Abbreviations for Use on Drawings has been published by the American Standards Association, 70 E. 45th St., New York 17, N. Y. To bring the 1946 edition of the standard up to date with latest industry-wide practice, a committee representing technical associations, industry, government, and independent experts developed this edition which, it is believed will greatly aid draftsmen, shopmen, assemblers, and construction men in interpreting industrial drawings made by various companies and branches of the government.

The revised edition contains special new sections on abbreviations for colors, valves, and screw threads. The section on abbreviations and letter symbols for cable and magnet wire has been greatly enlarged to include colors of cable and magnet wire. Over 200 changes have been made in the abbreviations included in the original edition, and more than 40 new abbreviations have been incorporated.

Copies of the American Standard Abbreviations for Use on Drawings, Z32.13-1950, may be obtained at \$1.00 each from the American Standards Association at the address given above.

#### Cutting Tool Manufacturers Association Elects Officers

At its annual meeting, the Cutting Tool Manufacturers Association reelected Emil Gairing, Gairing Tool Company, as president. Walter Fuller, Fuller Tool Company, was elected vice president, and R. S. Spencer, Detroit

The Wood & Spencer Company



### **CONTINUOUS HINGES**

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AUTO MOULDING & MFG. CO.

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### Why THOR STAMPS Last Longer



... because they're made of a special, correctly-heated alloy steel. Central striking point assures uniform marking. Thumb side marking assures easy use.

You get more mark per dollar with THOR STAMPS. Write for catalog and prices.

The Pittsburgh Stamp Co., Inc.



## Stack Up"



Sterling Bin Front "Top Rim"
Steel Stacking Box.
Size: 18" x 12" x 6".

### THESE BOXES AGAINST ANY!

Once you use and compare Sterling stacking boxes, you'll know why we invite comparision in design, construction, and price. Our "Top Rim" construction provides stronger support all around the box... no corner inserts to become loose and fall out. Efficiency in designing and manufacturing allows us to quote favorably on any type or size stacking box.

Write for literature and prices.

Sterling Factory Equipment Co., 183 Charles St., Providence, R. I.

Sterling "Top Rim" Steel Stacking Box with drop handles. Size: 18" x 12" x 6".



Sterling
Quality Handling & Storage Gequipment



Emil Gairing

Boring Bar Company, was reelected treasurer. The following men were elected to the board of directors: Gordon J. Birgbauer, Super Tool Company; K. R. Beardslee, Carboloy Company, Incorporated;

J. I. Schultz, National Broach and Machine Company; and R. G. Mitchell, Eclipse Counterbore Company.

### Giddings & Lewis Announces Promotions

Three promotions of major importance have been announced by Ralph J. Kraut, president and general manager of the Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Edgar L. McFerren has been made chief engineer, succeeding K. F. Gallimore who will continue as a director and vice president and consulting engineer. Fred C. Freund has been appointed assistant works manager, replacing E. L. McFerren as assistant to W. E. Rutz, executive vice president and works manager. R. G. Commo has been promoted to supervisor of personnel, heading the Industrial Relations Department.

National Automatic Tool Company Celebrates 50th Anniversary

This year the National Automatic Tool Co., Inc., Richmond, Ind., is celebrating its 50th anniversary. In 1901 a group of six men from the National Cash Register Company developed a new type of drilling machine with multiple spindles and formed a new

### **Nicholson Expanding Mandrels**

### **Cut "Machine Down" Time**

Records in many shops show Nicholson expanding mandrels actually get operations completed in less time than was formerly consumed in providing solid arbors. In cases this results in a tremendous cut in "down" time. Set of 14 of these precision tools replaces 209 solid arbors, for all bores 1/2" to 7". Two types; for square, hexagonal

### W. H. NICHOLSON & CO.

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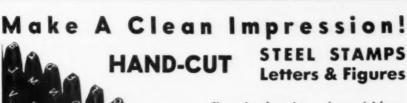
broached, round holes. Sold singly or in sets.

**Bulletin 750** 

Steam & Air Traps . Control Valves . Espan. Mandrels . Arbor Presses . Welded Floats









Deep, hand-cut letters in special-formula steel assure clean impressions and long service. Face of stamp is angled for extra strength. Chamfered corners for locating the base. Ask for Hoggson Brand at mill supply houses.

HOGGSON BRAND

HOGGSON & PETTIS MFG. CO., New Haven, Conn.



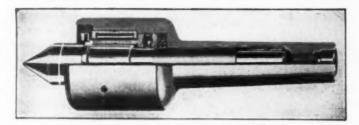
(Left to right) H. W. Bockhoff, president and chairman of the board; E. D. Frank, vice president and director; R. C. Schuerman, treasurer and director; and A. B. McCrea, secretary and director

organization which since has grown into one of the largest builders of multiple spindle drillers and tappers in the world.

At the start, the National Automatic Tool Company was located on the third floor of a building in downtown Dayton, Ohio, and occupied 3,500 square feet of floor space. Mr. Steven-

son, who held the patent for the independent change of speed for each spindle, was president of the company and Mr. Nutting, who introduced the Type A machine with hex head, was vice president. In 1908, William F. Bockhoff acquired full control of the company which, in 1910, was moved to Richmond, Indiana, into much larger

### Increase Production with Motor Tool LIVE CENTERS



These Ball and Roller Bearing Centers with the Exclusive OVERLOAD INDICATOR increase production, because work or centers will not burn out, regardless of how long the run. Well-engineered to provide years of trouble-free service, even under most severe conditions.

### ACME TOOL COMPANY

73 WEST BROADWAY

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### DIVIDING HEADS



3 SIZES — 4 MODELS — 6" to 12"

CARROLL DIVIDING HEAD CO.

3525 Cardiff Ave., Cincinnati 9, Ohio

### CAMS

A complete cam cutting service for both large and small cams is offered by our ROWBOTTOM and DALY cam milling facilities.

May we quote YOU?

BLAIR TOOL AND MACHINE CORP. 119-03 15th Ave. College Point, L. I., N. Y.



### CARTER PRODUCTS COMPANY INC.

47 Mount Vernon, N. W., Grand Rapids 4, Mich.

### LESS CLEANING

MORE PRODUCTION



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### Doyle VAC-IT

Subtract from cleaning expenses and add to production profits the time you can save by taking advantage of the powerful cleaning capacity of the Doyle Vac-It. Production machinery is thoroughly cleaned and freed of all clogging dust, dirt and grime in a fraction of the time ordinary cleaning methods take. Metal chips, shavings, grease and liquids are quickly removed from working surfaces leaving them clean and dry. So efficiently does the Doyle Vac-It perform that it is not necessary to stop production or shut down machinery during cleaning.

Write today for informative Doyle Bulletins. See how you can cut cleaning time and costs throughout your entire plant.

### DOYLE VACUUM CLEANER COMPANY

3225 Stevens St., S.W., Grand Rapids 7, Mich.

quarters. In 1924, Harry W. Bockhoff became vice president and general manager of the company and upon the death of his father, became president in 1928. Among the many industrial positions held by Mr. Bockhoff was his directorship of the National Machine Tool Builders Association in 1947.

The year after Natco moved to Richmond, Edward D. Frank came to work for the company as chief engineer. Shortly thereafter he was made plant superintendent and a few years later became sales manager, a position he still holds although he is vice president and a director as well. Another officer who has been with the company for many years is R. C. Schuerman, treasurer. Mr. Schuerman came to Natco in 1928 as supervisor of the accounting department and in 1937 was elected treasurer and director.

The 1/4" MallDrill that outdrills all Drills...



### and we'll prove it in your plant under your own conditions

Whatever your drill requirements

• capacity • apeed • weight • type of power
you'll find them in a MaliDrill for continuous trouble-free production
Write today for a demonstration or the useful booklet. "Mose Hotes is
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and pneumatic are available. For Mali makes the complete line of portable

36 Factory Service Branches in U.S. and Canada with complete



78148 S. Chicago Avenue., Chicago 19, III.

Manufacturers of over 1000 Tools for A Million Jobs

Erma B. Hunt has taken an active interest in the company, particularly since the death of her father, W. F. Bockhoff. In 1929 she was elected a director and in 1940 operating vice president and director.

Secretary of the company is Allen B. McCrea who came to work for Natco in 1937 and was elected secretary the following year. In addition. Mr. McCrea was made supervisor of cost reduction in 1940, and from 1944 to 1946 he was in the army. In 1947 he became factory manager.

During World Wars I and II, Natco made important contributions by deliver-

power tools



#### DRILL THESE HOLES

BY A QUICK, EASY, INEXPENSIVE METHOD

Your business letterhead will bring literature.

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### CAMS

Our ROWBOTTOM cam cutting facilities are at your disposal for your cam requirements.

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BLOOMFIELD TOOL CORP.

37 FARRAND ST. BLOOMFIELD, N. J.

### **USE ECONOMY**

Headless Set Screws Socket Set Screws





Try Them On Your Next Job!

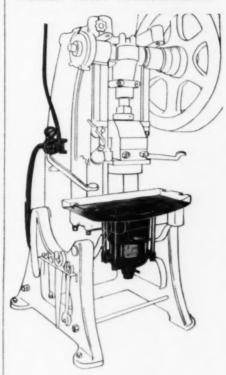
### ECONOMY MACHINE PRODUCTS COMPANY

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### DIE CUSHIONS

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PUNCH PRESS REQUIREMENTS



Adaptable to all deep drawing operations and all pressure pad control on forming dies.

Write for catalog No. 100

DAYTON ROGERS
Manufacturing Company

Minneapolis 7, Minnesota

ing great quantities of vital high production precision machines used in the mass production of automotive, aircraft, and other types of essential equipment. In 1943, new plant additions added several thousand square feet of needed assembly and shipping space. However, today new buildings are nearing completion which will provide for engineering and welding expansion, and the entire Natco plant will soon include 254,000 square feet of floor space. The buildings are all modern with air-conditioned office and engineering sections. Production areas house thousands of manufacturing machines with giant electric cranes and special development and research sections.

Taylor Dynamometer & Machine Company Moves to New Quarters

The Taylor Dynamometer & Machine Company, manufacturer of "Hi-Eff" precision drilling machines, dyna-



mometers, and balancers, has moved into new quarters at 528 W. Highland Ave., Milwaukee, Wis. According to A. C. Flamme, a company executive, the move was made to accommodate increased demands for the firm's products. With the newly increased facilities, Mr. Flamme states that the company will be able to double its former output.

#### Buckeye Brass Observes 50th Anniversary

The Buckeye Brass & Mfg. Co., Cleveland, Ohio, a leading manufacturer of bearing bronze, has announced its 50th year of service to industry. According to O. G. Gundel, president, and L. P. Disinger, vice president, the company's earliest activity was a pattern shop and brass and bronze foundry. During World War I, the company's activities and facilities rapidly expanded into specialization in the manufacture of bronze bushings and bearings and since that time the company has been regarded as an important source of supply for meeting the power transmission requirements of machine tool, automotive, textile, aircraft, engine, locomotive, electric motor, general industrial machinery, marine, farm equipment, and other industries.



### FOR Cost Reduction

Snow Air-operated, Electrically **Controlled Machines and Fixtures** · Single Spindle Verticals · Two-Spindle Verticals . Two-Spindle Horizontals . Automatic Nut Tapping Machines . Drill Press Tap Heads . Automatic & Semi-Automatic Jigs & Fixtures

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### SNOW

SHOW MANUFACTURING COMPANY 435 Eastern Ave. . Bellwood, Illinois (Chicago suburb)

### WESTLEN Adjusted Conto

For feeding strip and wire coll stock to presses, capacity 300 to 500 lbs. Outside ring dia., 28" to 36". Wheel automatically adjusts parts to suit coils from 11" to 20" Arm allows for quick conversion to horizontal or vertical pasition and adjusts height of reel.



Coil

The RULETA Co. 27 WARREN ST. NEW YORK 7.

### CARBOLOY TIPPED SCRAPER BLADES

Available in three widths





Especially good for hard alloy iron and extremely hard bronze castings. If you are using Anderson Hand Scrapers it is not necessary to buy complete new scrapers in order to use carboloy tipped blades. Simply remove high-speed blade and slip in the Anderson Carboloy Tipped Blade.

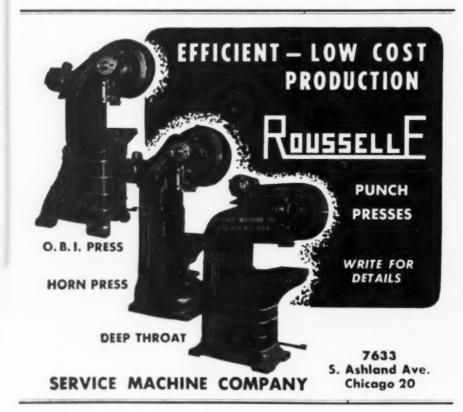
Write for Bulletin No. 2-22 ANDERSON BROS. MFG. CO., Rockford, III.

Balancing Ways, Roto Checkers, Hand and Power Scrapers, Spotters, Hand and Power Hydraulic Straightening Presses. In addition to manufacturing standard sleeve type bronze bearings and fully machined bronze maintenance bars, the company has complete laboratory, metallurgical, pattern, and machine facilities for the production of bearings to any desired metal analysis. Among the many special type bronze bearings are four designs of graphited bearings available in any size.

### Charles Eisler Receives Honorary Doctor of Science Degree

Bloomfield College and Seminary, Bloomfield, N. J., has conferred the honorary degree of Doctor of Science on Charles Eisler, president of Eisler Engr. Co., Inc., Newark, N. J., and inventor, designer, and machine builder, for his "outstanding achievements in the incandescent lamp and radio tube industries."

Mr. Eisler, who is 66 years old, came to this country as a youth from Budapest, Hungary. He has been a member of the American Society of Mechanical Engineers for 35 years and in 1920 founded the company which bears his name. Previously, he had been with the Westinghouse Company, Bloomfield Division, as chief engineer of equipment. Mr. Eisler holds more





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MILLING SERVICE .. JIG BORING ... SPOT

WELDING ... CON-

EISLER ENGINEERING CO





198-A LABAYETTE ST. N.Y. 12, N.Y.

### Fast-Set Lathe BORING BAR HOLDER



Eccentric adjusting barrel assures parallelism in adjusting these lathe tools. %" max. bar 3/4" max. bar 1" max. bar 1" max. bar bench 8-12" swing 14-20" swing \$12.00 \$20.00 \$30.00 for tool post \$20.00 BORING BARS 1/8×6" \$4.00 5/8x 91/2" 1/16×7" 3/4x101/2" 7/8x11" \$4.00 \$5.50 1/2×8" \$4.00 \$7.00 9/16×9" \$4.00 1×12" \$8.00 FOR 10 DAY FREE TRIAL MAIL AD TO: 49 Park Place, N.Y.C.7





(Left to Right) R. G. Schneider, Sales Promotion Manager of Lodge & Shipley; J. Herbert Myers, Vice President in Charge of Sales, and William L. Dolle, President, point out features of new "60" Right Angle Chucking Lathe during first showing.

access to the controls by the operator, and less cost than the conventional straight line lathe.

than 50 important machinery patents which are in use throughout the world.

### Lodge & Shipley Introduces Right Angle Chucking Lathe

The first showing and demonstration of a new type lathe designated as the Lodge & Shipley "60" Right Angle Chucking Lathe was witnessed recently by a large number of the leading manufacturers in the metalworking field and members of the industrial press. Held at the company's plant in Cincinnati, the showing and demonstration revealed the development of a lathe which is designed specifically for the machining of large diameter work.

Wm. L. Dolle, President of Lodge & Shipley predicted extensive application of the new lathe as a general purpose machine on the basis that the new lathe provides for unusually accurate and fast machining, loading and unloading with greater ease and facility, sensitive control, a minimum amount of floor space required, easy

### A.S.T.E. Meeting Program Geared to Defense Effort

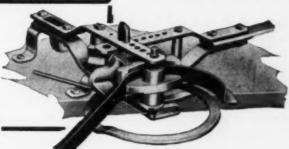
In view of international developments, technical sessions planned for the 19th Annual Meeting of the American Society of Tool Egineers to be held in New York from March 15 to 17 inclusive will attempt to cover some of the most recent advances in many phases of production. The prime objective is to disseminate as much new production know-how as possible to the men in industry responsible for applying this know-how in defense production; namely, the tool engineers.

On the tentative agenda are five papers covering new developments in pressworking of metals, eight papers related to machining, six papers on inspection and quality control, and eight papers on tooling. The general subjects of processing and planning, production management, gear production, special production processes, and so on, will also be covered. In all, 33 production "know-how" papers are scheduled thus far.

Bends Flat, Round Bar, Angle Iron and Pipe!



TYPICAL BENDS made with No. 2 Hossfeld Bender.



### HOSSFELD UNIVERSAL Pipe, Bar and Angle Iron Bender

Bends 3" x 1/4" flat, 5/8" round or square, 2" I.D. pipe, and 2" x 2" x 3/16" angle iron. An inexpensive bender ideal for every kind of shop.

NEW hydraulic powered unit makes this bender ideal for production jobs. Write today for complete details.

### HOSSFELD MFG. COMPANY

DEPT. MMS . WINONA, MINNESOTA



### THE WON TO MAKE SET-UPS FASTER

In these days of rising labor costs, saving time on any operation is becoming increasingly important, because saving time means saving money.

On tapping and reaming jobs, for example, you will find that you can save considerable time in aligning the work with the spindle by using a Ziegler Tool Holder instead of an ordinary tool holder.

Because of its floating action, the Ziegler automatically compensates for inaccuracies in spindle alignment up to  $1/32^{\circ}$  diameter, or  $1/16^{\circ}$  radius. It is therefore unnecessary to spend as much time as is required in making the set-up with ordinary tool holders in order to insure against oversize and bell-mouthed holes.

Get a Ziegler Floating Holder and see for yourself how much time it saves.

W. M. ZIEGLER TOOL CO.

FLOATING HOLDER for Taps and Reamers ...

13566 AUBURN DETROIT 23, MICH.



#### Did You Know That ---

Charles E. Newman has been appointed sales engineer for the Chicago territory by Surface Combustion Corporation. In this new capacity, Mr. Newman will be associated with William M. Dempster of the Chicago office, and will be handling all lines of Surface Combustion standard industrial equipment.

George H. Lynn has been appointed general sales manager of the Hamilton Division. Baldwin-Lima-Hamilton Corp., Hamilton, Ohio. In his new capacity. Mr. Lynn will be in charge of sales of machine tools, can machinery, Diesel engines, and special equipment, with offices in Hamilton.

Kenneth R. Arvedon has been appointed field secretary of the National

> Tool and Die Manufacturers Association and will aid and service members in the metropolitan area for both the National Association and the New York Tool and Die Institute. His offices will be located at 17 E. 42nd St., New

York.

-- 0 ---

L. W. Jander has been appointed sales manager of the industrial division of Henry Disston & Sons. Inc., Philadelphia, Pa., manufacturer of saws, tools, files, and special steels. Mr. Jander succeeds J. F. Wilkinson, who has resigned to enter his own industrial distributing business in Miami, Florida.





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700 Pages, 450 Illustrations

Sections on:

Easy methods of computing press jobs
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 Glossary of terms used in the pressed metal industry.

Plus a complete service section covering all types of Bliss presses, old and new. \$7.50.

E. W. BLISS CO.

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Rush me a copy of the Bliss Power Press
Handbook

### "OLIVER" 36-INCH BAND SAW

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Powerful!
Cuts true
and steady.
Quick-change
rim and
tire.
Automatic

brakes.

Write for Bulletin 116-S.

OLIVER MACHINERY CO., Grand Rapids 2, Mich.

# F.O.B. FACTORY Bay Stacking Box



Reinforced Corners • Drop Handle
Each End • Spotwelded Construction
• Four Rivets for Extra Strength •
Continuous Stacking Rim All Four
Sides.

WIRE . WRITE . PHONE: BAldwin 9-1805

 Product Number
 Width
 Length
 Height
 Gauge Steel

 80ID-18
 10"
 16"
 6"
 18

BAY METAL PRODUCTS . 3015 N. 16th St., Philadelphia 32, Pa.

#### Did You Know That ---

The Billings & Spencer Co., Hartford, Conn., manufacturer of wrenches and shop tools, has announced the appointment of Ludwig W. Ritschel as representative in the Philadelphia territory, which includes the greater part of Pennsylvania, all of Delaware, as well as portions of southern New Jersey and Maryland. Ernest B. Meynard has been appointed assistant sales manager of Buckeye Tools Corporation, manufacturer of portable air and electric tools. Mr. Meynard has been associated with Buckeye Tools since 1942, serving in various sales and service capacities.

Nelson J. Leonard, who has long represented Cleveland Tramrail overhead materials handling equipment in

-0-

the State of Washington, has been granted a franchise to cover the entire Northwest Territory. Mr. Leonard's main office is located at 5764 28th Ave., N. E., Seattle 5. Wash.

-0-Charles H. Besly & Company, Chicago manufacturer of abrasive wheels. grinders, taps and reamers, has announced the election of Norman C. Minehart as vice president in charge of the company's Abrasive Division, and Jack T. LeBeau as manager of the Abrasive Department. Both men will make their headquarters at Besly's general office at 118 N. Clinton St., Chi-



Highest grade, heat-treated alloy steel for greater strength.

Ground to infinite degree of accuracy. No binding, backlash or inplay of pins. Concentricity guaranteed within 0005. Exceed Armed Forces rigid requirements.

14 SIZES - Bores 3/16" to 2". Overall length 1%" to 10%".

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#### Did You Know That ---

James Gerity, Jr., president of the Gerity-Michigan Corp., Adrian, Mich., has been elected a director of the Doehler-Jarvis Corp., New York.

Morse Twist Drill & Machine Co., New Bedford, Mass., has announced the appointment of F. C. Helms, Jr., as midwest branch manager, succeeding Charles F. Myers who was recently appointed sales manager with headquarters in New Bedford. Norman S. Fagerson has been appointed Morse representative in the Chicago area to succeed M. P. Lansing who now represents Morse in Texas.

Henry A. Vaughn has been appointed manager of manufacturing of the General Electric Company's Meter and Instrument Divisions at Lynn, Massachusetts.

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At a meeting held recenly in New York City, Bernard J. Wolfe, design engineer, Haloid Company, Rectigraph Division, was appointed chairman of the executive committee of the Machine Design Division by the American Society of Mechanical Engineers.

The L. S. Starrett Co., Athol, Mass., has announced the appointment of Robert J. Hause as sales representative in Minnesota and adjacent territory, with headquarters in Minneapolis, Mr. Hause was formerly located in the company's Chicago branch.

The Whiton Machine Co., New London, Conn., has announced the appointment of Evan Price as turbine sales manager, with headquarters in the New London offices of the company.

-0-



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Most modern Nibbler for Template Cutting, Tool Rooms, Shipbuilding, Aircraft Parts, Aircraft Tubing, Sheet & Plate Shops.

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OTHER STYLES AND SIZES IN NEW MANUAL ON FINISHING-WRITE TODAY

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Round, square or hex collets, plain-serrated

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#### Did You Know That ---

SKF Industries, Inc., Philadelphia, Pa., has announced the appointment of Gunnar Palmgren, formerly chief engineer, as assistant vice president, and Arthur S. Roberts, formerly counsel and secretary, as general counsel and secretary. In addition, Jack R. Bremer has been appointed assistant purchasing agent of the ball and roller bearing firm.

Emil R. Schaeffer has been appointed manager of manufacturing of the General Electric Company's Switchgear Division at Philadelphia, Pa., according to an announcement by R. F. Tinnerholm, manager of the division.

Alphons J. John has been named to head a newly created Employee-Public Relations office at the Kearney and Trecker Corporation, according to

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President Francis J. Trecker.
Mr. John has been advertising manager of K & T since 1946 and will continue in that capacity.

Charles W.
Jinnette, Norton
Company's regional manager of
business planning
and development,
retired recently
after 50 years
and six months of
active service
with the company.

-0-

Frederick
W. von Raab has
been appointed
manager of warehouse distribution
for The Carpenter Steel Company and will
have his headquarters at the
company's main
offices in Reading,
Pennsylvania.







VAN PRODUCTS CO.
13M G. D. BALDWIN BLDG.
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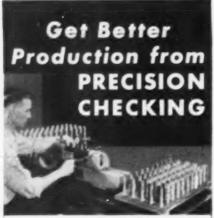
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FREE Additional Data



covering complete specifications and additional features is contained in this bulletin. Write for your copy today, Ask for data sheet No. 505.



Sundstrand Machine Tool Co.

#### Did You Know That ---

The election of Richard H. DeMott, president of SKF Industries, Inc., to its board of directors has been announced by the Anti-Friction Bearing Manufacturers Association. Mr. De-Mott, associated with the industry since 1915, is chairman of the association's defense committee.

Appointment of Robert W. Snowdon as plant manager of the recently-acquired New Brighton works of the Heppenstall Company, Pittsburgh, has been announced by Robert B. Heppenstall, president of the firm.

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Frank Hallberg, previously associated with the Clinton Machine Company, as well as various other firms, has been appointed chief engineer of the Ross Operating Valve Co., Detroit, Mich., according to an announcement made by John Sainsbury, president.

George T. Walne, vice president of General Box Company, died recently at the age of 46 of a heart attack while enroute to his home in Louisville.

-0-

J. Richardson Dilworth of Princeton, N. J., has been elected to the board of directors of Rockwell Manufacturing Company, according to an announcement made by W. F. Rockwell, Jr., president of the company.

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Edward J. Lilly has been appointed sales engineer for the Butterfield Division, Union Twist Drill Company, manufacturer of taps, dies, reamers, and special metal cutting tools. Formerly associated with the Simonds Abrasive Company, Mr. Lilly will represent the Butterfield Division in the Philadelphia and Baltimore areas with headquarters in Philadelphia.

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Write for Bulletin 100

Dept. MMSA-2

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SOMETHING
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Sine No.	Brandard Braw Collets	Emparties Inclusive	Bady Diameter	Overall Length	Approximate
113	"3C"	1 64" to 11"	244"	30 - 244"	2 ling.
114	"4C"	1 64" to 14"	214"	46 - 3"	314 fbs.
115	"3C"	1 64" to 1"	3/4"	SC - 312"	455 Bu.
116	112311	1 32" to 1 to"	415"	21-34"	615 Bes.
117	"31"	1/32" to 114"	419"	W-314"	615 Res.

Stallion MANUFACTURING CO. 2017 N. HALSTED ST. CHICAGO 14

Did You Know That ---

The Timken Roller Bearing Co., Canton, Ohio, has annouced the appointment of Dwight A. Bessmer, director of purchases, to the position of assistant to the president. Mr. Bessmer will continue his duties as director of purchases until a successor is chosen.

R. K. Warren has been appointed assistant manager of tool steel sales for the Crucible Steel Company of America, succeeding George T. Fraser, who has been appointed manager of sales for Rem-Cru Titanium, Inc.,

-- 0 --

Bridgeport, Conn. Mr. Warren will make his headquarters in Syracuse where Crucible's tool steel production and sales activities are centered in the Sanderson-Halcomb Works, of which Ira G. Sutton has been appointed general superintendent.

At a meeting of the board of directors, W. R. Persons was elected vice president in-charge-of sales of The Lincoln Electric Company. He advances to his new position as an officer of the company from his present one of general sales manager which he has filled since 1946.

Mahlon M. Matchett has been appointed sales engineer for the Illinois Tool Works, Chicago, according to an announcement made by Harold Byron Smith, president. Mr. Matchett will be associated with the company's Tool and Machine Division and will make his headquarters in the Detroit office. -0-

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Earl H. Schaefer, formerly assistant manager of Elgin National W a t c h Company's plant in Lincoln, Neb., has returned to Elgin as chief manufacturing engineer, while Werner M. Lienert succeeds Mr. Schaefer at Lincoln as assistant manager.



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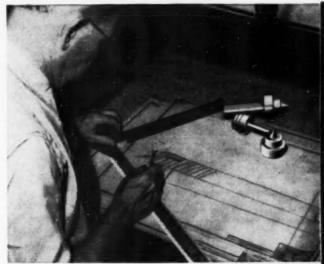
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### Book Reviews

Pressworking of Metals. Second Edition. By C. W. Hinman. Published by McGraw-Hill Book Co, Inc., 330 W. 42nd St., New York 18, N. Y. 551 pages. Illustrated. Cloth binding, board covers, Price, \$8.50.

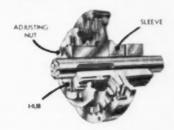
In this revision of his practical work on the design of press tools and the fabrication of metals in power presses, the author presents nearly 1,000 press tool designs, types of presses, attachments, and pressroom accessories, and tells how to use them in die engineering practice. The operating principles of the tools are frequently pointed out so that the designer can apply them in other designs of dies. The clear, profusely illustrated treatment shows how to select presses, covers workability of material, and provides many basic tool designs which can be adapted to a variety of specific presswork problems.

The book emphasizes the mechanical problems in die engineering from the standpoint of the principles involved. In addition to considerable handy data and suggestions on the use of presses and materials, the book includes numerous fundamental designs. each of which embodies the means of simplifying presswork, increasing output, saving time and material, or accomplishing difficult operations. Various types of presses in common use are illustrated and described, and the practical factors of selecting the proper press for any paricular die job are presented.



# The NEW Improved series of HILLIARD Slip Clutches

- PROTECT YOUR MACHINERY
   FROM DESTRUCTIVE OVER-LOAD
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REGULAR SERIES—From 50 inch lbs. to 300,000 inch lbs. torque. Prevents transmission of overload. Constant torque clutches can be pre-set. NOW AVAILABLE — Adjustable while running constant tension clutches. Provide ample friction surface for heavy duty use in reeling and winding operations.

THE NEW LIGHT SERIES—high capacity in small size. From 10 inch lbs. to 500 inch lbs. torque. Metallic plates, disk springs. Constant torque—easily adjustable.

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Test prove that Star Molyflex Blades cut 23.8% more metal than the average of eight other leading high speed blades

tested! That means they're extra tough—and that they cut clean and easy, too. Molyflex high speed steel blades are completely shatter-proof—completely unbreakable in a frame. They're available in a complete range of sizes and pitches. They're made to handle your roughest, toughest metal-cutting jobs.

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These extruded soapstone crayons can be used on hot, cold, damp or grimy metals. Markings withstand pickling-will not affect enamel applications. A complete range of sizes and shapes.

Ask your distributor for free copies of the STAR Wall Chart and STAR Metal-Cutting Booklet. They'll show you how to get maximum cutting results from hand, hand and hower blades.

The STAR Line is complete - there's a STAR Blade that's right for every cutting job a hack saw or band saw can handle.

## CLEMSON BROS., INC. - Middletown, N. Y. U.S. A. Makers, of hand and power had

Makers of hand and power hack saw blades frames, metal-cutting band saw blades and Clemson Lawn Machines

Tool Engineering, By A. P. Gwiazdowski. Published by C. C. Nelson Publishing Co. Appleton, Wis. 320 pages, 6 x 9 inches. 237 figures. 28 tables. Cloth binding, board covers. Price, \$6.00.

In simple, easy to understand language this book takes the student through the practical phases of manufacture. It supplements the purely theoretical side of the tool engineering course but still serves as a refresher

even for veteran tool engineers, according to the publisher.

In preparing the book, the author decided that the subject matter should be presented as a series of manufacturing processes cemented together by the design of tools for a representative machine part. The connecting rod cap has been used as a binder, assuring continuity of discussion in the logical sequence of processing and machining operations. The course

can be completed in fifty 40-minute classroom periods with about 60 hours of homework. The latter time is used for the study of the text, for assigned computations, and for drawing cutting tools. gages, and six important designs of jigs, fixtures and dies. However, additional chapters and assignments provide an abundance of material for a longer course.

The contents of the book are divided into 20 chapters headed as follows: The Engineer-Creator of Abundance: Industrial Organization; Limits. Tolerances, and Allowances; Meas-



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a set consisting of:

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uring and Gaging; Procedure Used in Tool Design; Grinding and Honing Process; Milling Process and Fixtures; Work-Holding Fixtures; General Rules for the Design of Jigs and Fixtures; The Broaching Process; The Drilling Process; The Reaming and Tapping Processes; The Extrusion of Metals; The Stamping Process; Gear Calculations and Shop Drawings of Gears; Cutting Fluids; High-Speed

and Commercial Tool Steels; Heat Treatment of Ferrous Alloys; Jigs and Fixtures Made by Welding Process; and Jig Borers and Jig-Boring Methods.

The A. M. A. Handbook of Wage and Salary Administration. Edited by M. Joseph Dooher and Vivienne Marquis. Published by American Manage-

ment Association, 330 W. 42nd St., New York 18, N. Y. 416 pages. Cloth binding, board covers. Price, \$7.50 (A. M. A. Members, \$5.00).

This volume represents a complete guide to principles and techniques of wage and salary administration and company experiences with all major types of job evaluation and wage administration plans. The book is an integrated compilation of the best material on wage and salary administration that the Association has published, representing the work of leading authorities in the field. It contains, in addition. new A. M. A. re-

## Slash metal forming costs...





Shops that are wasting manpower with hand brakes or tying up big machines with small odd jobs have the an-

swer to their problems in the new Verson 16-48 Press Brake. Compact and low in cost, the 16-48 brings the advantages of power operation and big brake design to smaller shops. Bed and ram length is 48". Capacity ranges from a 48" length of 16 ga. steel to a 24" length of 10 ga. steel. Allsteel construction assures perfect alignment and maximum rigidity. Write for a copy of Bulletin 16-48A; it gives complete design details, specifications and capacities.

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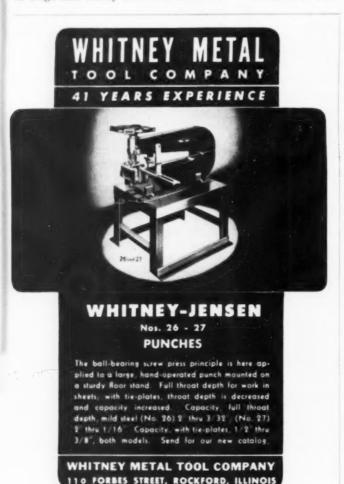
Worcester 6, Massachusetts

search material on wage surveys, union contract provisions covering office salary administration, and job evaluation forms, as well as an up-todate bibliography.

Setting forth the basic principles and requirements that must be considered at every stage of planning and administration, the book is designed to meet the needs of companies that contemplate setting up a formal program of wage and salary administration for the first time, as well as those who wish to review and improve their present programs in the light of tested and up-to-date techniques. It provides a balanced treatment of all the major types of job evaluation plans, representing many different schools of thought, together with case accounts of their use and adaptations to meet special problems in large and small companies.

In addition to a comprehensive dis-

cussion of the basic principles and approaches in wage and salary administration, the 34 chapters of the book cover such subiects as techniques of the wage survey; case histories in wage and salary administration; effective compensation methods for salaried jobs; supervisory and executive salary administration: joint labormanagement job valuation; salary administration for multi-unit operations: methods for keeping wage programs up-todate; selected forms for job evaluation; and results of recent research into simplified wage adminis-



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- Adaptable to any Position
- 50 lb. Magnetic Pull

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#### ELIMINATES ALL CLAMPING

against any round or flat iron or steel surface. Holds test indicators. No clamps needed. Saves time trying to find suitable place to clamp. Powerful Alnico magnet exerts 50 lb. pull. Ball and socket and swivel arm construction gives versatile adjustment. Indicator Holder has 7/32" dia. stem, which handles most indi-



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73 Trowbridge Street Cambridge, Mass.

that is used by the Armstrong Cork Company to clearly explain its wage program to employees is reproduced in its entirety as an appendix to the volume.

Kinematics of Machines. Fifth edition. By George L. Guillet and A. H. Church. Published by John Wiley & Sons, 440 Fourth Ave, New York 16,

New York. 299 pages. Well illustrated. Cloth binding, board covers. Price, \$4.00.

In revising this book, an attempt has been made to maintain the conciseness and clarity achieved by Professor Guillet. The chapter on velocity and acceleration in plane motion has been largely rewritten, particularly the material on the image method, as it is believed that this portion could be expanded for better understanding.

At the end of this chapter an article on Coriolis' acceleration has been added.

The gearing chapter has also been largely revamped to shift the emphasis of gear kinematics to the currently used generating principle of producing gear teeth. In addition, the following changes have been made: revision of the articles on simple harmonic motion. and the scale determination for the velocity and acceleration curves in Chapter 2: the addition of the tabulation method for locating instant centers in Chapter 3: revised proof of Klein's construction and the inversions



of the slider-crank mechanism in Chapter 5; introduction of the pressure angle of cams, selection of cam motion, application of cams, and the method of manufacture in Chapter 6; emphasis on the tabulation method for epicyclic gear trains, and the addition of an article on epicyclic gear trains with no member fixed in Chapter 9. Some of the drafting room problems have been removed and new ones added. Uniform and constant symbols have been adopted. To keep the length of the book approximately the same, certain portions of Chapter 6 on circular arc cams and Chapter 10 on pulleys and sprockets were removed.

For further information on any product mentioned in this issue—use the READER SERV-ICE CARDS between the covers.





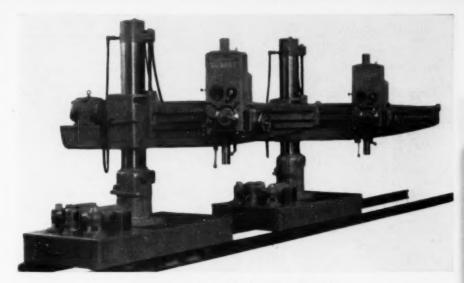
#### Machine Grinds Two Parallel Work Surfaces in One Operation

Gardner Machine Co., 428 E. Gardner St., Beloit, Wis., has announced a double disc grinding machine, designated as the Model 2V-18, which is designed to grind two parallel flat surfaces on small workpieces in one operation. The machine is provided with two 18-inch diameters x 2-inch thick solid center abrasive discs, each driven by a 3 or 5 h.p. motor. The 32-inch diameter rotary work carrier is made to suit the types and sizes of workpieces which are to be ground. Finger-tip speed control is provided for an infinite range of work carrier speeds between 18 and 1 r.p.m. A bayonet lock for the rotary work carrier permits a rapid change of the carrier plate when changing work setup or dressing the discs.

Both grinding heads may be independently adjusted by graduated handwheels. In addition, each head may be tilted for jobs requiring progressive grinding of the workpiece. The dresser mechanism is enclosed in the main machine column and is hand operated and adjustable for position. Dressing is done directly across the center of each disc so that no com-



Gardner Model 2V-18 Double Disc Grinder



Cincinnati Gilbert Track-Mounted Radial Drills

pensating settings have to be made when the grinding heads of the machine are tilted.

#### Radial Drill Features Traveling Base

A radial drill featuring a traveling roller bearing-mounted base has been developed by The Cincinnati Gilbert Machine Tool Co., 3360 Beekman St., Cincinnati 23, Ohio. The base, which measures 46 inches wide x 90 inches long, is designed to ride on standard Cincinnati Gilbert horizontal boring mill runways or 100-1b. rails. The unit carries, completely enclosed, all necessary power and electrical equipment. Traversing, clamping, and coolant pump controls are mounted on the base and duplicated on the drill head for the operator's convenience.

Power traversing and clamping equipment is optional. Under power, the unit traverses at a rate of 50 f.p.m. The traversing mechanism consists of a 1½ h.p. 960 r.p.m. motor adaptable to a.c. or d.c. sources; reversing control; worm-driven speed reducer; and heavy bevel gears for the final drive to one axie. Both axles rotate in Timken tapered roller bearings, and all mechanisms operate in oil or are permanently lubricated.

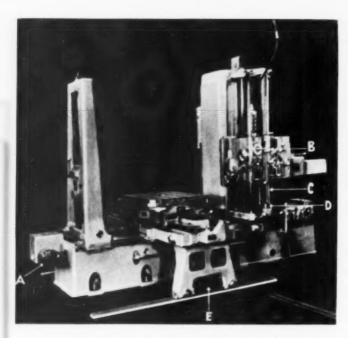
Clamps, located near each wheel, hold

the drill during operation. The clamping motor is equipped with a suitable reversing starter. The coolant pump, mounted on the machine base, has its own motor and starter.

#### Improved Cutting Oils Available in Various Viscosities

Gulf Oil Corp., 722 Gulf Bldg., Pittsburgh 30. Pa., has announced improvements in its Gulf Lasupar Cutting Oils which are available in a range of viscosities to permit a choice of the proper grade to suit the particular machining job. The improved oils are said to have the advantages of light color, good transparency, improved cutting ability, and anti-rust properties, while retaining all of the outstanding performance characteristics of the former grades.

Excellent anti-weld properties and load carrying ability are claimed to be obtained in the improved oils by the inclusion of free elementary sulphur, sulphurized mineral oil, and sulphurized fatty oil, the latter providing high lubricity and anti-weld properties which enable the oils to produce high quality surface finishes. In addition, the efficient cooling and extreme pressure properties of the oils permit their use over a wide range of machining operations.



#### Automatic Positioning Device for Table-Type Machines

Positive automatic machine settings within 0.0002 to 0.0005 inch are said to be possible with an electrically operated positioning device announced by Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. With the unit, horizontal boring machine table and headstock fine feed movements to predetermined settings are mechanically controlled without resorting to time-consuming hand adjustments.

Giddings & Lewis Series 300-RT Rotary Table Type Horizontal Boring, Drilling and Milling Machine equipped with Automatic Positioning Device. (A) Constant speed motor gear reduction unit and magnetic clutch used to drive machine feed screw. (B) Selector switch and dial indicator for headstock (C) Vertical shaft for holding measuring rods or job rods. (D) Auxiliary saddle sup-ports and runways reuired on all machines equipped with automatic positioning device.

Designed as a standard accessory for table-type machines equipped with saddle supports and auxiliary runways, the positioning device is claimed to be equally effi-

cient for use on a single workpiece requiring a series of bores or on a number of parts produced in job lots. The device consists of two complete control units, one for the lateral setting of the table on the saddle and the other for the vertical setting of the headstock on the machine column. These units may be operated individually or simultaneously, depending upon the requirements of the job. When the components of the positioning device are activated, they disengage the table or headstock rapid traverse directional controls and then automatically position the table or headstock in its final setting.



#### **Nut Driving Machine**

The Detroit Power Screwdriver Co., 2807 W. Fort St., Detroit 16, Mich., has announced a nut driving machine for driving nuts ranging from ½ to ½ inch across the flats either automatically or semi-automatically. The machine is fed by a rotary barrel type hopper which feeds the nuts.in a pre-positioned manner to the driving spindle. Therefore, the operator handles only the parts to be assembled, placing them in a locating fixture which is mounted on the work table of the machine.

The machine is said to be equally efficient for special nuts, such as jams, castillated, lock, and so on, and is capable of driving

meet practically all grease needs in the average industrial plant is now being offered by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 33, Pa. An outstanding feature of the grease is its resistance to high heat, cold, or wet conditions.

According to the manufacturer, Cosmolube is a cold-milled grease of very smooth texture, with excellent oxidation stability, and clings well to all metal surfaces, thus reducing leakage to a minimum. It is available in two consistencies, designated as NLGI No. 1 and No. 2

## **Non-Stop Fluid Cleaning**

Why there's no loss of production due to strainer cleaning when you strain with Cuno AUTO-KLEAN

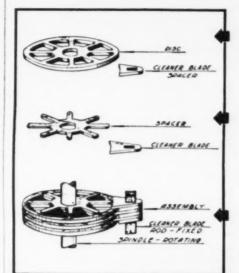


Detroit Power Nut Driving Machine

any nut within its range that can be selected and fed in a uniform position.

#### Multi-Purpose Grease

Known as "Cosmolube," an oxidation inhibited multi-purpose grease which is said to



Turning metal discs past cleaner blades\*...

combs out all solids, even imbedded in strainer...

without interrupting flow. No by-pass strainer needed.

\*Periodically by hand or continuously by automatic means.

All-metal AUTO-KLEAN is guaranteed to remove all solids larger than specified spacings (.0035 in. to .062 in.) Write for free AUTO-KLEAN bulletin. Cuno Engineering Corporation, 186 South Vine Street, Meriden, Conn.

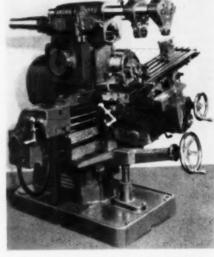


Fluid Conditioning

Removes More Sizes of Solids from More Types of Fluids

#### Machine Designed for Toolroom and Laboratory Milling

Designed primarily for toolroom and experimental laboratory milling, the Brown & Sharpe No. 0 Omniversal Milling Machine illustrated herewith, product of Browne & Sharpe Mfg. Co., Providence 1, R. I., is claimed to have all fundamental movements and adjustments common to the universal milling machine and, in addition, an angular adjustment of the table in a vertical plane at right angles to the spindle and a horizontal feed of the entire knee assembly in the same plane.



Brown & Sharpe No. 0 Omniversal Milling Machine

PUNCHES and

TO FIT MOST MAKES OF **PUNCH MACHINES** 

Large range of round, square, Hat, and aval sizes are carried in stoc for immediate shipment. Special tools are made to order

Catalog Sheets Available.

T. H. Lewthwaite Mach. Co. 317 East 47th St., New York 17

Accurate Hole Transfer Made Easy With NIELSEN TRANSFER SCREWS

Simply insert in holes, invert, strike sharply and you have centers and drill circles perfectly located. Reduce time and eliminate spoilage of other methods. B sizes, from 1 to 1/4" U.S.S. Inexpensive - Lost for years.

> Write for Circular NIELSEN TOOL & DIE COMPANY

> > P. O. Box 1067 Berkley, Mich

Moreover, the machine is equipped with a gear-driven milling head which is adjustable parallel to the overarms, is arranged for universal angular adjustment. and has a 2-inch hand feed of the spindle. The head may be used independently or in conjunction with the machine spindle.

Eighteen spindle speeds are provided-40 to 1.530 r. p. m. for the machine and 76 to 2.900 r. p. m. for the Omniversal head with an infinite number of feed changes from 1/2 to 15 inches per minute to meet a wide variety of milling requirements. Construction features include improved electrical controls, automatic lubrication, and heavy machine column with extended spindle face and convenient speed and feed controls.

THE CLUEL Drilling Machine Co., Cincinnati I, Ohio



Agent

the quality scotture is STAHDARG coresportion on all-steel shank

# DANLY DIE SETS

A new welding technique that assures 100% fusion of shank to punch holder makes this superior construction possible. Knock out holes in the shank itself or machining on the punch holder face are much less likely to effect shank strength.

Features like this make Danly the nation's leading die set producer. Check these other Danly Die Set advantages and you'll see why die makers and production men everywhere prefer Danly Die Sets

- Prompt Delivery
   Precision Construction
  - Broad Selection Danly Reliability

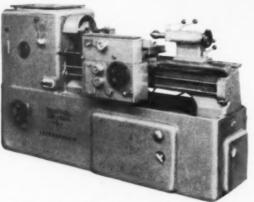
DANLY MACHINE SPECIALTIES, INC. 2100 South Laramie Avenue, Chicago 50, Illinois

SPECIAL



WHICH DANLY BRANCH IS CLOSEST TO YOU?

DAMLY



Threading Machine Produces Multi-Start Threads

Known as the "Cri-Dan," a threading machine for use in the economical production of multiple-start threads, as well as single-start threads, is now being marketed by The Lees-Bradner Co., Cleveland 11, Ohio. According to the manufacturer, practically any male multi-start

thread within the capacity of the machine and practically any multi-start female thread of approximately %. 1-inch or more minor diameter can be readily generated using merely an inexpensive single point high speed steel or carbide-tipped threading tool. Indexing on the machine is said to be completely automatic.

On the Cri-Dan, turns of the work spindle for "single" threading are an exact whole number of times a turn of the lead cam. Since the machine uses a lead cam instead of a

lead screw, by gearing the work spindle to make an exact whole number of revolutions plus a fraction of a turn for each revolution of the lead cam, multi-start threads are cut automatically; the calculation required is said to be simple. Then, with the gears and/or the lead cam calculated, multi-start threads are produced in precisely the same way that single start threads are made.

## WHISK OFF WELD SPATTER

You speed up welding---and save up to 85% of weld cleaning time and labor --- when you apply Protect-O-Metal No. 2 before welding. Just brush or spray it in weld seam and adjacent metal --- weld --- then whisk off spatter in a matter of seconds.



Protect-O-Metal will not cause smoke, fumes or odors. One coat serves for single or multi-pass welding. Costs 1/10e per foot of weld, saves up

PROTECT-O-METAL

to three times its cost in time savings alone... Order a trial gallon (\$3.25) satisfaction guaranteed or invoice will be cancelled.

G. W. SMITH & SONS, INC., 5407 Kemp Road, Dayton, O.

# FASTER precision TAPPING

## with fewer "rejects!"

Procunier High Speed Tap Head shows consistently better performance. When you have to produce—and time is short . . . put Procunier High Speed Tapping equipment on the job and watch production climb! Here is the secret . . . here's why Procunier Tap Heads turn out precision tapping with fewer rejects, fewer broken taps: Tap driving pressure is automatically regulated by the amount of pressure applied to the unique Procunier clutch. An operator can quickly detect dull or "loaded" taps-by the pressure needed to drive them. Blind tapping is done as easily as through tapping! Improved features include: heattreated gear mechanism for long, trouble-free life; ball bearings for lifetime accuracy; simple, one-hole lubrication system . . . as well as many others.

WRITE TODAY for illustrated brochure giving complete details, specifications and prices. Simply fill in and mail the coupon right now.

### Procunier

Safety Chuck Company

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Gentlemen: Please send your illust complete details, specif the improved line of i Tapping Heads.	Dept. 2 trated brochure giving ications and prices on Procunier High Speed
Name	
Address	



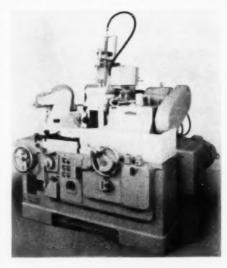
Also available—NEW! Procunier "TAP KING" for large hole tapping. Capacity— 1/8" to 1" in steel; 11/8" in softer metals.

#### Machine Designed to Grind Faces of Automotive and Aircraft Type Valves

Norton Co., Worcester, Mass., has announced a semi-automatic valve grinder which is designed to grind the face of automotive and aircraft type valves having face angles of 0 through 62½ degrees. Operating effort is confined principally to loading the machine and to movement of a single control lever, which provides for clamping of the workpiece in the workhead collet, starting of the grinding cycle, rotation of the work-

No. 92 BENCH PUNCH

piece, and coolant flow. A means is provided for obtaining an ultra-fine feed rate in the final automatic feed stage for



Norton Semi-Automatic Valve Grinder

Depth of throat
10 inches

PUNCHES—
Rounds, Squares, and Ovals.

NOTCHES
ANGLE IRON, 11/2"

W. A. WHITNEY MFG. CO.

assurance of fine finish. Termination of the grinding cycle on completion of the grind is effected automatically by an electric timer set for the particular time period necessary to obtain the size and finish desired.

The spindle of the workhead unit carries a draw type hydraulically-operated chuck for holding the workpiece. A radially adjustable faceplate provides for centralizing the workpiece in the chuck with respect to the center of the spindle, and end-stops control location of the ground surface relative to the grinding wheel.

## PRESTO! Your Bench or Engine Lathe BECOMES A TURRET LATHE

CATALOGUE

Several sizes for converting up to 24" swing. For forming, roughing, boring, drilling, tapping, finishing, etc. without stopping lathe or changing tools.

Send for catalog of Dividing Heads, Belt Sanders, Swing Grinders, Turret Attachments, etc.

JEFFERSON MACHINE TOOL CO.



702 W. Fourth St., Cincinnati 3, Ohio





M OST "run-of-the-book" tool room work comes within the capacity of Sheldon Precision Lathes—can be done with equal accuracy, at lower tool cost, lower power cost, in less time, and at greater profit on a Sheldon than it can on many of the costly, cumbersome, space wasting older lathes found in most shops.

These extremely accurate (Zero Precision Taper Roller Bearings), large capacity for size (1½" hole thru spindle), light, fast, easy to operate, space saving, moderate priced lathes will turn out not only more pieces per dollar, but on many jobs, more pieces per hour, than most older large lathes. When figuring replacement of obsolete equipment, remember you can have two or more of these efficient little money makers for the tool investment you made for the large lathe you are replacing.

WRITE FOR CATALOG.

## SHELDON

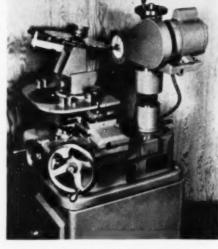
SHELDON MACHINE CO., INC.

4250 N. Knox Ave., Chicago 41, III.

#### Designed for Multi-Purpose Sharpening Operations

Known as the Model CT-18, a universal grinder which is designed for multipurpose sharpening operations on carbide-tipped circular saws, knives, and cutter heads has been announced by the Hanchett Mfg. Co., Big Rapids, Mich. Equipped with a circular saw fixture, the grinder can be used to sharpen both metal and wood saws of inserted-tooth, segmental, solid carbide-tipped, beveled. and straight-tooth types, as well as standard saw blades, ranging in diameter from 8 to 24 inches. When equipped with a revolving knife bar fixture, the grinder can be used to sharpen thick or thin knives 12 inches long x 4 inches wide.

Another fixture is available which is designed to handle side head cutters, and a head and tailstock unit make it possible to sharpen molder top heads. For



Hanchett Model CT-18 Universal Grinder

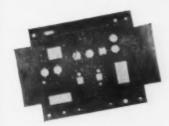


finish grinding thin strip steel stock, a magnetic chuck serves as a holding fixture. The wheel head column revolves 360 degrees for adjustment at any angle and is capable of handling wheels of the straight, saucer, cup. cylinder, or flaring cup types. The spindle is constructed of alloy steel and utilizes spring-loaded ball bearings. The base is available in either a bench or floor type.



if you produce...





#### SEE WIEDEMANN

Hulletin 231 describes the most efficient method of producing chassis and similar week in short runs and semi-production runs. Repost runs of 5 to 1,500 pieces and single runs of 50 to 5,000 pieces are economically produced on the Wiedemann RA-41P. Write today for bulletin 241,





THE WIEDEMANN METHOD permits you to: (1)

Keep up with engineering changes without materially affecting production schedule; (2) Keep tool inventory low; (3) Produce quantities in accordance with sales requirements; (4) Produce accurate work with inexpensive tools.

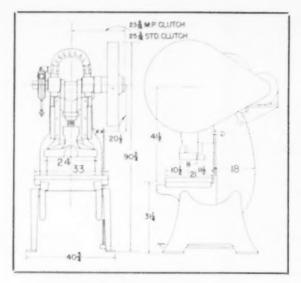
"THE WIEDEMANN METHOD" through the elimination of expensive punch and die set-up and work location methods, provides an efficient means of piercing single pieces, and semi-production runs, regardless of repeat frequency.

Machines available for piercing sheet and plate up to ½" thick, up to 120" wide x 200" long.

Wiedemann TURRET PUNCH PRESSES

WIEDEMANN MACHINE COMPANY

4219 Wissahickon Ave., Phila. 32, Pa.



Detailed drawing showing front and side view of Federal No. 44 Press

Power Press

Designated as the No. 44, a power stroke of 6 inches, standard shut height press with 35-ton capacity, standard of 10 inches, and throat depth of 11½ inches has been introduced by the Federal Press Co., 504 Division St., Elkhart, Ind. The unit is also available on any stroke from 1 to 12 inches and with frame extension or added shut height from 1 to 10 inches over the standard model. The press has a 33 x 21-inch bed area and a 24 x 8-inch ram face.

Features of the Federal No. 44 press include a removable ball seat, roundtype ram clamp, and convenient rear-operated reclining mechanism. In addition, the

press incorporates Timken bearings, non-repeat clutch (standard or multipin) mechanism, and time-saving knockout bracket.

Get a higher percentage of acceptable work in producing PRECISION HOLES

Amazing improvements in volume of production and precision of holes are on record as a result of giving ma-chine operators COM-TOPLUG. This unique hand gage, enables operator to keep machine adjusted better. Automatically and positive. y assures correct q... ing to fractions of 0001". Detects out-ofround, tapers, mouth, etc. COMPLETE-AND POSITIVELY ACCURATE IN HANDS OF RELATIVELY UN-TRAINED PERSONS — AT MACHINE OR INSPECTION LINE Applicable to work still in chuck if desired: shows actual size-just right for Statistical Quality Control. THE Answer to war conditions, involving great urgency, green help. rough handling of gages



COMTORPLUG gages bores to fractions of .0001"
REQUEST BULLETIN 40
COMTOR CO. 64 FARWELL STREET.
WALTHAM 54, MASS.

For data on COMTORGAGE Precision External Gage, request Bulletin 30.

# AIR-LIFT LIGHTENS LOAD for LAUNDRY WORKERS...

Air Cylinder Reduces Fatigue, Speeds Production, Cuts Costs!

By proper application of a NOPAK Model E Air Cylinder. the National Marking Machine Co. has made its Damp Net Lift a real labor-saving device. It makes the former heavy task of handling damp bundles light, quick and simple; does away with "back-breaking" labor, speeds up work, reduces shakeout costs.

The proper application of NOPAK Valves and Cylinders can improve the performance of equipment that you build or use . . . for production, maintenance, or material handling.

GALLAND-HENNING MFG. CO.

2758 S. 31st St., Milwaukee 46, Wis.

Write for Bulletin SW-1 or refer to Sweet's File for Product Designers.

Representatives in Principal Cities



DESIGNED for AIR and HYDRAULIC SERVICE

National Damp-

AND CYLINDERS

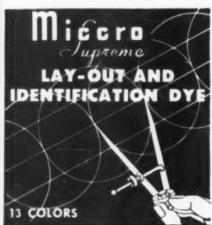
#### Hob Sharpening Checker

Barber-Colman Co., 8539 Loomis St., Rockford, Ill., has announced a hob sharpening checker for measuring inac-



Barber-Colman Hob Sharpening Checker

curacies in hobs or formed cutters due to face sharpening. The instrument is designed to check radialism, flute-to-flute spacing, tool spacing, face offset, and accuracy of straight flutes with the axis of hobs and cutters. It may also be used for checking runout of faces and outside



For Tool, Die, Pattern or Template layout on metal . . . Quick identification of bar stock, sheet, strips or parts . . . Shows up in sharp relief — dries instantly . . Write for sample and circular on company letterhead.

MICHIGAN CHROME & CHEMICAL COMPANY

diameters of hobs, as well as the o.d. runout of the hob or cutter itself.

The hob sharpening checker is constructed to utilize the standard index plates of the Barber-Colman No. 12 hob sharpening machine. These plates are 9½ inches in diameter, and index is said to be held to ±0.0005 inch adjacent and ±0.0015 inch total error. Special precision plates are available with adjacent spacing error of only ±0.00025 inch and non-adjacent error of ±0.001 inch.

#### Universally Adjustable Work Head

Known as the "Unihead," a universally adjustable work head which is said to provide flexibility in grinding spiral mills, end mills, keyway cutters, stagger-tooth cutters, angular cutters, saw blades, and other types of cutters has been introduced by the Delta Power Tool Division, Rockwell Mfg. Co., 602F E. Vienna Ave., Milwaukee 1, Wis. Design-



Delta "Unihead"

ed primarly for use on the swivel table of a Delta toolmaker tool and cutter grinder, the head can be used on other makes of machines when a Delta stoptooth unit is used in connection with it.

The head consists of a heat-treated sleeve arranged with a No. 9 Brown & Sharpe taper accurately mounted in preloaded, sealed, life-lubricated ball bearings. An adjustable index stop collar and dog can be disengaged or set in any position desired. The 12-tooth index collar with selector plate permits the dog to automatically engage either 2, 3, 4, 6, or 12 selected equal spaces. The head also preserperates a swivel bracket with 360 graduations.

### "no more GAMBLING on tool steel selection"

Since the first announcement, hundreds of tool steel users have received their CRUCIBLE TOOL STEEL SELECTORS. The comments received indicate that this handy method of picking the right tool steel right from the start is going over big

"Handiest selector I've ever seen"

"No more gambling on tool steel selection" "You're right, the application should dictate the choice of the tool steel" . . . and many, many more favorable comments.

You'll want your CRUCIBLE TOOL STEEL SE-LECTOR. It uses the only logical method of tool steel selection-begin with the application to pick the right steel! And the answer you get with one turn of the Selector dial will prove satisfactory in every case, for the CRUCIBLE TOOL STEEL SELECTOR covers 22 tool steels which fit 98% of all Tool Steel applications. ALL the tool steels on the Selector are in Warehouse Stock . . . that means when you get the answer, you can get the steel . . . fast!

Write for your Selector today! We want you to have it, because we know you've never seen anything that approaches your tool steel problems so simply and logically. Just fill out the coupon and mail. Act now! CRUCIBLE STEEL COMPANY OF AMERICA, Chrysler Building, New York 17, N. Y.



Selector diameter 9", in 3 colors

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Gentlemen:	
Sure! I want my SELECTOR!	CRUCIBLE TOOL STEEL
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## CRUCIBLE first same in special purpose steels

TOOL STEELS

fifty years of Fine steelmaking

Branch Offices and Warehouses: ATLANTA . BALTIMORE . BOSTON . BUFFALD . CHARLOTTE . CHICAGO . CINCINNATI CLEVELAND . DENVER . DETROIT . HOUSTON . INDIANAPOLIS . LOS ANGELES . MILWAUKEE . NEWARK . NEW HAVEN NEW YORK - PHILADELPHIA - PITTSBURGH - PROVIDENCE - ROCKFORD - SAN FRANCISCO - SEATTLE - SPRINGFIELD, MASS. - ST. LOUIS - SYRACUSE - TORONTO, ONT. - WASHINGTON, D. C.

#### Toolroom Lathe

Recommended for both sensitive instrument work and heavy carbide cuting, a precision toolroom lathe identified as the Model 1020S and announced by Rivett Lathe & Grinder, Inc., Brighton 35. Boston, Mass., is said to handle any toolroom turning within its 12½-inch swing and 20-inch centers. Features of the lathe include a three spindle mounting; free spindle by direct belt drive operating at infinite speeds up to 3600 r. p. m.; antifriction bearings throughout; gearbox providing 72 feeds and 84 threads; and headstock back gearing at speeds ranging from 22 to 400 r. p. m. Operating conven-



Rivett Model 1020S Toolroom Lathe

ience is obtained by providing push-button controls for the variable speed drive and electric carriage, a neutral clutch to stop the spindle without stopping the drive, and a convenient handwheel for turning the headstock spindle.

#### CLEVELAND Lead screw tapping machines

Increase your efficiency by combining

envii.

these operations

- Tapping
- Threading
- Drilling
- Spot-facing
- Reaming
- Chamfering

Write for Catalog 283-W-3

THE CLEVELAND TAPPING MACHINE CO.

A Subsidiary of Automatic Steel Products, Inc.

CANTON 6, OHIO

#### Magnetic Sheet Support for Shear

Designated as the "No-Sag," a magnetic sheet support designed to support a sheet to be sheared so that it can be pushed against the back gage angle for accurate gaging on Cincinnati all-steel shears has been announced by The Cincinnati Shaper Co., Cincinnati 25, Ohio. The support is built with permanent Alnico magnets, with a unique roller arrangement that is said to provide for easy handling of the sheet when feeding the shear. According to the manufacturer. there is no noticeable drag on the sheet due to the magnetic holding, and the pieces are automatically stripped off the support as they are cut. When cutting plate, the magnets can be raised to minimize wear and possible damage.

The magnetic sheet support is designed

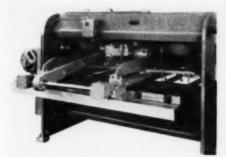
## 14" Model D METAL SAW Built by the Band Saw Pioneers

Capacity: 14" x 18". Maximum clearance under saw blade is 20". Vise swivels 45" in either direction. Machine raises and lowers hydraulically---can be set for automatic or semi-automatic cutting. Also built in 9" size.

Write for complete details.







Cincinnati shear equipped with "No-Sag" Magnetic Sheet Support

to handle all magnetic materials up to 16 gauge thickness and can be supplied with 36 or 48-inch back gaging range.

#### Magnetic Chuck and Power Supply Unit

Known as the "Body Flo Jr.," a 6-inch electromagnetic chuck and power supply unit designed primarily for holding work-pieces on small-sized surface grinders has been developed by Magnetic Holding Devices, Inc., 2034 E. 22nd St., Cleveland 15, Ohio. According to the manufacturer, the magnet is capable of holding small or large work in either horizontal, vertical, or angular setups. The magnetic chuck measures 6 x 4 x 2 ii inches overall.

The power supply unit features a copper sulfide rectifier, convection cooling system, and a "Mag-Demag" switch. Input of the unit is 110 volts, a.c. and output is 6 volts, 4 amperes d.c. The power supply unit measures  $4\frac{1}{2} \times 4\frac{1}{2} \times 8$  inches.

Magnetic Chuck and Power Supply Unit



# BETTER BUILT FOR FASTER, MORE ACCURATE WORK! BRADFORD

HEAVY DUTY PEDESTAL GRINDERS

Bradford "Metalmaster" Grinders are designed and engineered to handle your external grinding and tool sharpening operations with greater efficiency and economy. Heavy Duty Model 200 (illustrated) has motor totally enclosed to N.E.M.A. specifications. Ball bearings sealed in dust-proof housings are used throughout. Spindle is chrome-nickel steel. Wheel guards are adjustable radially and have hinged doors. Construction includes exhaust connections, spark breakers, eye shields, positive shaft lock.

tive shaft lock, tool tray and water pot. Meets American Safety Code standards.

220-440, 550 volts, 50 or 60 cycles, 2 or 3 phase. SIZES: 2, 3, 5, and 71/2 HP.



Many other models and sizes. See your Bradford Distributor or write us about your grinder problems.

Portable Electric Drills . Saws . Sanders . Polishers Bench Grinders . Pedestal Grinders . Buffers

#### THE BRADFORD MACHINE TOOL CO.

658 EVANS ST.

CINCINNATI, OHIO



Stackbin Spare - Part Box

#### Spare-Part Boxes

Stackbin Corp., 1983 Main St., Pawtucket, R. I. is now offering complete facilities for the manufacture of spare-part boxes as required by the various branches of the armed services. Applicable for storing electrical or mechanical parts — for shipboard or field use—

these sturdy steel boxes can be furnished to any government specifications. Assemblage includes all-welded construction.

#### Vapor Collector

Designated as the Model VC-5, a highvolume self-contained collector which is said to have an ample capacity for collecting large volumes of vapor and mist from screw machines, centerless grinders, chucking machines, and so on, has been annouced by the Aget-Detroit Co., Ann Arbor, Mich. The vapor or mist is condensed by a non-infammable spunglass filter, the replacement of which is

seldom but easy. The collector is driven by a 5-h.p. motor which is said to develop 3.600 c.f.m. at 5 inches water lift through an 8-inch inlet.

The vapor collector is furnished complete with motormounted starting switch and drain spout for returning collected condensate to the machine reservoir or to waste as desired. The unit is designed



Aget-Detroit Model VC-5 Vapor Collector

for overhead mounting, the space required being 28 x 28 inches with an overall height of 56½ inches.



High Carbon, High Chrome Blades.

BEVERLY SHEAR MFG. CO., 3000 W. 111th St., Chicago 43, III.

#### Vertical Milling Machine

Designated as the No. 10-R, a universal-ram turret-type vertical milling machine designed for performing a wide variety of operations, including jig-boring, drilling, tapping, keyway milling, end milling, profile milling, die sinking, and so on, on a single workpiece at any angle in both vertical and horizontal planes has been announced by the Fray Machine Tool Co., 515 W. Windsor Rd., Glendale, Calif. Milling, drilling, and boring operations can be accomplished at longitudinal angles by traversing the ram on the turret slide, or crosswise angles by

operating the ram in its saddle. The machine incorporates an "Allare calibrated in one-thousandths of an inch to maintain accuracy, and the column and knee are heavily ribbed to ensure rigidity. Large bearing surfaces are provided for both the column and saddle, as well as between the saddle and table.

#### Power Hack Saw

The Sales Service Machine Tool Co., 2363 University Ave., St. Paul 4. Minn., has announced that its portable Jefferson "601" power hack saw has been redesigned to accurately cut material up to 3½ x 3½ inches and permit angle cutting



Fray No. 10-R Vertical Milling Machine

Angle" milling attachment which can be rotated 360 degrees around the overarm and 90 degrees forward and backward.

The ram is operated by means of a ball crank on the end of a feed screw. A 3-inch dial, calibrated to one-thousandths of an inch, determines the ram movement. The table has three machined T-slots with channels and sump at each end for draining off coolant. Table stops

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Poland, Ohio, P. L. Duer

1200 to 2875 Lbs.

MODEL
A0-80

Pressures

Pressures 80 to 190 Lbs

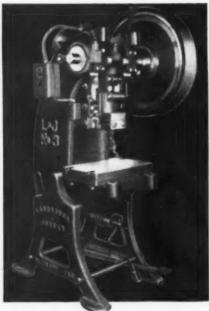




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Their rugged construction gives you longer die life... better work...less maintenance. It will pay you to find out how these O.B.I. presses can give you better production. Made in 12 models back geared and plain flywheel types

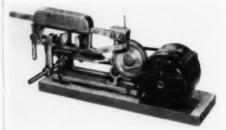
6 to 80 ton capacities.

Write for literature.



PRESS CORP.

ELKHART, INDIANA



Redesigned Jefferson "601" Power Hack Saw

of 2%-inch material up to 45 degrees. The full cutting stroke of the saw is  $3\frac{1}{2}$  inches. The saw incorporates a 10-inch blade as standard equipment.

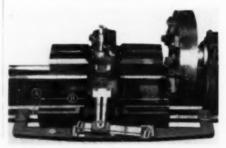
Pressure relief on the return stroke is said to reduce unnecessary blade wear, and a special latch bar holds the frame in a holsted position when new material is being placed in sawing position. Standard equipment also includes a gage bar and a ½-h.p. electric motor.

#### Taper Attachment

A taper attachment for taper turning, boring, and threading on all makes of engine and toolroom lathes has been announced by the Master-Taper Co., 4531 N. Beacon St., Chicago 40, Ill. The attachment is designed for lathes having a swing up to 36 inches and will cut a 20-degree or 4-inches-per-foot, taper. It will also cut 12 inches longitudinally at one setting. The accompanying illustration shows an actual installation, the attachment being mounted on a 28-inch swing lathe, with V-ways at point A and 36 inches at point B.

The sliding fixture has a long bearing surface with gibs to compensate for continuous usage. The swivel bar has V-ways with the ends graduated in degrees and in inches per foot.

Master-Taper Attachment mounted on 28-inch swing lathe



#### Electric Drills Have Capacity Range from 1/2 to 3/4 Inch in Steel

Four completely redesigned electric drills with capacities ranging from 1/2 to % inch in steel have been added to its "Skil" line by Skilsaw, Inc., 5033 Elston Ave., Chicago 30, Ill. The 1/2 and %-inch models are heavy duty high speed drills weighing no more than 141/4 lb. and measuring less than 161's inches in length. High torque, low speed models are available in % and %-inch capacities, with comparable advantages in weight and length. Speeds range as low as 250 r.p.m.

and as high as 1,000 r.p.m. All models have die cast aluminum alloy housings, oversize ball bearings, rett Co., Athol, Mass., is adjustable to size by means of a convenient knurled knob at the end of the gage. The gaging surface



Starrett No. 830 Small Hole Gage

is formed with a flat bottom to permit use in the shallowest holes, slots, and re-CORRER



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GROBET FILE COMPANY of AMERICA, INC.

421 CANAL STREET

hole gage, desig-

nated as the No.

830 and announced by The L. S. Star-

cost.

NEW YORK 13, N. Y.

#### Collet Chuck Adaptable to Various Machine Tools

Quickly adaptable to lathes, drill presses, or milling machines for use in performing turning, milling, drilling, grinding, deburring, and polishing operations, a quick-acting draw collet chuck available in sizes to accommodate collets from \$\delta\$, to \$1\frac{1}{4}\$-inch capacity is being offered under the trade name of Davos by Stallion Mfg. Co., 2017 N. Halsted St., Chicago 14, Ill. The construction of the chuck allows for the easy insertion of a stop for second operations.





Davos Collet Chuck

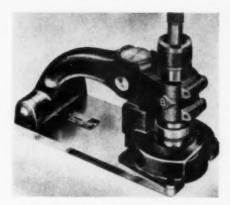
Quick opening and closing of the chuck are effected by simply pulling the operating lever forward and backward. Stock may be removed while the lathe is in operation. The chuck is hardened and precision ground and can be readily attached to the spindle nose or faceplate of a lathe. Collets may be quickly and easily interchanged with no adjustments necessary.

#### Portable Precision Surfacer Eliminates Hand Scraping

Designed to eliminate hand scraping in obtaining accurate dead-flat surfaces, a portable precision surfacer which accommodates standard 3-inch cup wheels that can be operated at 6,000 r.p.m. has been announced by Reid Brothers Co., Inc., Beverly, Mass. Attractively finished in enamel with all vital parts of stainless steel, the unit includes a spindle which is totally enclosed and fitted with pre-







Reid Portable Precision Surfacer

cision ball thrust races. The work face of the sole plate is grooved to reduce friction and to ensure positive contact between the surfacer and the work. A micrometer adjustment provides positive control of the depth of cut, a maximum of 0.005 inch being obtainable.

The workhead is delicately balanced and spring loaded and is detachable to allow for use with flexible shaft equipment. The angle of contact between the grinding wheel and surface is adjustable from 0 to 2 degrees.

#### Bench Center Provides Convenience for Inspection Work

The Delta Power Tool Division, Rock-well Mfg. Co., 602H E. Vienna Ave., Milwaukee I, Wis., has announced the availability of a bench center which is said to provide convenience and accuracy for inspection work. The bench center is capable of handling a maximum

of 19½ inches between centers and 10½ inches over the bed. A universal indicator support bracket, available as extra equipment, makes the bench center a self-contained unit and can be quickly and firmly locked to the bed. The arm for holding the indicator can be placed in any position, either vertical or horizontal.

Design and construction features of the bench center include a heavy cast bed, fully normalized to relieve all strain; accurately ground top surface with milled T-slot for clamping head and tailstock and indicator support bracket;





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## DIE SINKING CUTTERS by RELTOOL Available from Stock



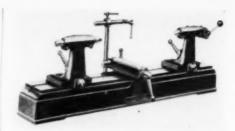
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Drills \* Tops \* Tool Bits \*
Specials.





Delta-Milwaukee Bench Center

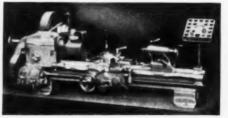
precision-bored head and tailstocks that are identical castings and interchangeable; and 60-degree angle centers.

## Toolroom Lathe Capable of Handling Work up to 10 Inches in Diameter

Known as the "Light Ten." a lathe capable of handling work up to 10 inches in diameter over the bed and designed primarily for precision toolroom operations has been announced by the South Bend Lathe Works. South Bend 22, Ind. The lathe has a maximum swing over the cross slide of 6½ inches and a swing over the saddle wings of 9½ inches. The lathe is driven by a ¼-h.p. motor, and the headstock is back geared, providing spindle speeds ranging from 48 to 1,435 r.p.m. No. 2 Morse taper centers are used in the headstock and tailstock spindles.

The lathe is available in bed lengths of 3, 3½, and 4 feet with maximum distances between centers of 16½, 22½, and 28½ inches respectively. Standard equipment includes a quick change gearbox which provides a thread cutting range of 48 pitches, 4 to 224 per inch r.h. or l.h., and 48 longitudinal power feeds.

South Bend "Light Ten" Toolroom Lathe

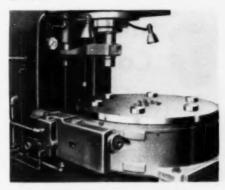


#### Hydraulic Index Table for Presses

A 33-inch hydraulic index table with a 24-inch work cycle designed for use with its 35-ton "Multipress," as well as other makes of equipment, has been announced by The Denison Engineering Co. 1153 Dublin Rd. Columbus 16. Ohio. Hydraulically powered, the table provides variable speeds for any preselected indexing rate from 10 to 70 indexes per minute and positions the dial to a tolerance of 0.002 inch. When installed on the Multipress, the table is powered by the pumping unit through the control system of the press. The table can be operated by a small auxiliary pumping unit when used with other than hydraulic equipment.

Available in 6 and 12-station types, the table operates from, and in positive sequence with, the action of the press ram through the control system of the hydraulic power unit, thus providing for positive interlock. The tooling stations are accurately located about the circular dial which is rotated and indexed by a Geneva arbor drive mechanism actuated by a variable-speed Denison fluid motor. Operations of the Multipress and in-

dex table combination can be made completely automatic by the use of automatic hopper feeds together with ejection devices.

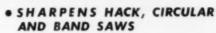


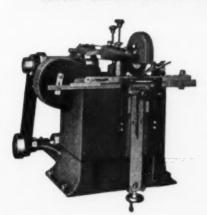
Denison Hydraulic Index Table installed on 35-ton "Multipress"

A built-in "skip-station" accessory is available for the table, thus permitting skipping from 1 to 5 stations without a loss of time at each idle station.

## **PAYS for ITSELF in 1951**

WITH SAVINGS IN HACK SAW BLADES ALONE





Instead of only 2 or 3 sharpenings per blade the EC Automatic Grinder sharpens hack saw blades 5 or 6 times before they require replacement. The EC is fully automatic grinding from 30 to 75 teeth per minute. This is the only grinder that does not depend on the shape of grinding wheel edge to shape the cutting edge of the tooth. Write for Bulletin EC Combination Hack, Circular and Band Saw Grinder . . . Wardwell Mfg. Compuny, 3166 Fulton Road, Cleveland 9. Ohio.



### HALLOWELL



HALLOWELL Solid Steel Collars, functionally proportioned throughout... precision-machined so faces run perfectly true... are beautifully polished all over... yet they cost less than common cast iron collars. 3" bore and smaller are made from Solid Bar Stock. To make sure the collar won't shift on the shaft, they are fitted with the famous UNBRAKO Knurled Point Self-Locking Socket Set Screw—the set screw that won't shake loose when once tightened. HALLOWELL... a "buy word" in shaft collars... available in a full range of sizes for IMMEDIATE DELIVERY.

Write for name and address of your nearest HALLOWELL and UNBRAKO Industrial Distributors.

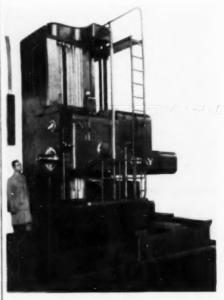
-SPS-

STANDARD PRESSED STEEL CO.

JENKINTOWN 22, PENNSYLVANIA

#### Horizontal Boring, Drilling, Milling Machine Effectively Utilizes Heavy Duty Carbide Cutters

Available in both 7 and 8-inch sizes, a floor-type horizontal boring, drilling, and milling machine designed to effectively utilize heavy-duty carbide milling cutters working at maximum capacity has been introduced by The G. A. Gray Co., 3611 Woodburn Ave., Cincinnati 7. Ohio. The machine is equipped with a



Gray Floor Type Horizontal Boring, Drilling, and Milling Machine

50 to 100-h.p. spindle motor, and precision boring and drilling are accomplished by means of 24 spindle speeds in geometric progressions up to 600 r.p.m. on the main spindle. Continuous bar feed and traverse is available up to 84 inches, and two feed motors permit independent feeding of the head and column. The full pendant station control of the machine provides for automatic power clutch shifting and automatic hydraulic clamping.

Spindle speeds can be quickly and easily changed by means of an "Insto-Shift" device, and a Gray Electric Woodpecker is said to permit quick power positioning of the head and column to an accuracy

of 0.00025 inch or less.

#### Automatic Indexing, Drilling and Tapping Machine

Known as the "Burgmaster." a six-spindle automatic indexing, drilling and tapping machine for use where drilling, spot-facing, threading, counterboring, reaming, tapping, and other second operations are required has been announced by Burg Tool Mfg. Co., Dept. MM, 3743 Durango Ave.. Los Angeles 34, Calif. The automatically indexing six-spindle turret of the machine permits any desired sequence of operations to be performed. Each of the six spindles may be operated

at a different r.p.m. by means of high, medium, or low gearing on the

"Burgmaster" Six-Spindle Automatic Indexing, Drilling and Tapping Machine

spindles. For economy, power is supplied only to the spindle being used. A positive stop may be set for each spindle, and coolant is supplied from a tank and pump in the base of the machine.

All castings used on the machine are No. 3 grade grey iron, normalized to relieve stress. Precision ball and roller type bearings are used throughout. All parts subject to wear are machined of high grade tool and alloy steel, heat, treated and ground when necessary. Additional features include a ram feeding unit having three spokes of convenient length to provide the correct amount of leverage and to make large hole drilling relatively easy; precision depth stop assembly which is said to permit accurate depth control within limits of 0.001 inch; and safety shield for protecting the operator from the spindles during indexing.

Various attachments are available for

### DRILL BREAKAGE REDUCED 86.7%

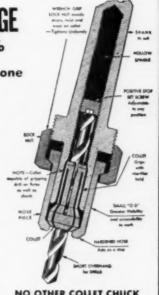
Here's How It Was Done

Large automobile manufacturer, famous for production efficiency, gave us the following report of a test of the Erickson Collet Chuck. As a result of this test, manufacturer has standardized on Erickson Collet Chuck for this operation.

"Érickson Chuck is used for drilling 1200 vent holes per day, average drill breakage one per day. We formerly broke 8 to 10 drills with the . . . chuck. Now have average breakage of 2 drills per 900 oil holes drilled in pistons with 1/8" Erickson Chuck. Had breakage of 15 drills per 900 holes using old drill sleeve method."

### Can Be Yours, Too!

Send for complete data on Erickson holding equipment now and learn how Erickson tools applied to your problems can boost production and reduce costs.



#### NO OTHER COLLET CHUCK ON THE MARKET

- 1. Delivers accuracy of .0005"
- Permits collapse of 1/32" (Replacing 7 standard single purpose collets).
- Grips drills on flutes permits stubbing
- Give such positive grip due to exclusive surface contact.

#### **ERICKSON TOOL DIVISION**

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SMOOTHER — MORE FLEXIBLE CONTROL — FINER FINISHES with the new Electrically-controlled

Table Drive.
HIGH-PRECISION CUTTING
EDGES and LONGER-LASTING
BLADES from new permanentlyaligned Knife Bar.

A massive machine, made in sizes up to 108" work piece capacity.

WORLD'S LARGEST MANUFACTURERS OF SAW SHARPENING AND KNIFE GRINDING MACHINERY MANUFACTURING HANCHETT

Main Office—Big Rapids, Mich.

the Burgmaster, including drill chucks or No. 2 M.T. spindles for drills, combination tools, and hollow mills; a positive drive type tapper with  $\frac{\pi}{6}$ -inch capacity in aluminum and a friction type tapper with  $\frac{\pi}{6}$ -inch capacity in steel; and a 9/16-inch self-opening die head for external threading.

#### Power Parter

O'Neil-Irwin Mfg. Co., 306 8th Ave., Lake City, Minn., has added to its "Di-Acro" line a power parter designed for



"Di-Acro" Power Parter

accurately cutting or "parting-off" rods and bars without distorting their roundness or crushing the material. The unit is equipped with an air cylinder, cushioned at both ends for quiet and efficient operation, and each cutting cycle is instantly obtained through a four-way foot valve.

The standard cutting head of the unit is provided with ten holes for rods ranging from \$\frac{1}{12}\$ to \$\frac{1}{12}\$ inch in steps of \$\frac{1}{12}\$ inch. Special size round holes can also be supplied. Square, rectangular, hexagon, and other shaped bars can often be cut satisfactorily, and cutting heads can be made to order for these operations. An outstanding feature of the unit is an Ejectomatic gage which permits three separate operations of gaging, parting, and ejecting to be performed in a single working cycle.

yet LOW in price!

356

KNIFE GRINDER

COVEL

MODERN MACHINE SHOP

#### Universal Joint Designed for Light Duty Applications

Curtis Universal Joint Co., Inc., Springfield 7, Mass., has developed a ball type universal joint designed for light duty applications and available in four sizes of ½, ¾, 1, and 1¼ inches for single or double, solid or bored hubs. The joint includes steel forks bearing upon a bronze ball and having heat-treated centerless ground pivot bearing pins, the larger pin being provided with an oiler to enable proper lubrication of all bearing points.

The accompanying exploded view of the joint shows its simplicity and ease of

assembly and disassembly. Applications for the joint include milling, drilling, gear cut-



Curtis Ball Type Universal Joint

ting, grinding, buffing and polishing, wire drawing, threading, pressing, welding, oil grooving, and other machinery.

#### Insert Bits

Hy-Pro Tool Co. New Bedford. Mass, is now marketing a line of insert bits and bit holders manufactured from special shock-resisting alloy steel, heat treated and tempered to the correct degree of hardness and toughness. The bits are precision cold forged by a special process.



Hy-Pro Phillips Insert Bit and Bit Holder

Said to last indefinitely, the bit holders are each designed with an efficient ball and spring lock in the head that is claimed to effect a positive tight-fitting grip while driving and yet allow for quick changing of bits. Four sizes of insert bits are said to drive the entire range of Phillips screw and bolt sizes.





### Now Two Types

Available in 18-gram and 5-gram color-identified, dust-proof cartridges for use with the Hyprez Applicator Gun.

#### Developed and Shop-Tested for Automatic Machine Lapping Hole Sizing and Finishing Tungsten-Carbide Finishing

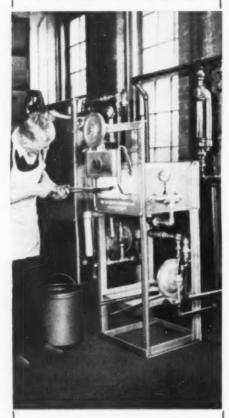
Same quality, same grades, same prices as "W" compounds which remain the universal diamond obrasive for finer, faster finishing. All Hyprez Diamond Compounds are formulated of accurately-graded diamond particles of lasting cutting power—evenly and permanently suspended in a scientific vehicle.

Write for free demonstration or complete description to Dept. S-251

HYPREZ DIVISION ENGIS EQUIPMENT CO.



### YOUR GAS FURNACE



THE AGF NO. 16-F OVEN FURNACE IS ONE OF THE MOST WIDELY USED FURNACES IN SMALL & LARGE SHOPS.

CHAMBER SIZE-8" wide x 4" high x 14" long. Made by the "Pioneer" manufacturers of gas furnaces and heat-treating equipment.

Write for Bulletin No. 206, to-



MERICAN GAS

ELIZABETH 4, N. J.

#### Rivet Set Available in Five Standard Sizes

Available in five standard sizes for 14 to fi-inch rivets, a rivet set made from special Mecco safety steel to prevent



Cunningham Rivet Sets

spalling, mushrooming, and injury to personnel has been announced by M. E. Cunningham Co., 158 E. Carson St., Pittsburgh 19. Pa. Two shank designs are offered: the Cunningham Wedge Grip design providing a knurled grip, and the standard straight shank design.

#### Lathe Turning Tool Offered with High Speed Steel or Carbide-Tipped Blade

Combining a choice of high speed steel or carbide-tipped blade and a heat-treated chrome-nickel-steel holder, a turning



Bokum Lathe Turning Tools

tool for lathes and turret lathes has been announced by the Bokum Tool Co., 14775 Wildemere Ave., Detroit 21. Mich. The tool is available in six styles designed for roughing, semi-finishing, finishing, straight shoulder turning, cutting off, and threading operations. Each style is made in three sizes.

The cutting blade is locked in the holder at proper cutting and clearance angles and is inclined at such an angle as to offer maximum resistance to chip load pressure. The clamping force between the serrated blade and the clamping pad is such that the tool becomes more rigid under increasing cutting pressure. The tool is designed for sharpening on one face only.

#### Portable Thickness Gage for Sheet Stock

Identified as the Model 644, a portable thickness gage for the rapid checking of sheet and strip stock is now being marketed by Federal Products Corp., 11410 Eddy St., Providence I. R. I. The gage can be used to check incoming material to ensure receipt of proper stock sizes; assure issuance of correct sheet thickness from stockroom to manufacturing for stamping, blanking, drawing, and

forming; measure stock before and after plating operation to determine thickness of plating, and so on.

The measurement is quickly and accurately transferred to a full-jeweled dial in dicator. graduated to 0.001 inch, through hardened steel upper 1800 lower



Federal Model 644 Portable Thickness Gage

contact points. The wide-faced springloaded upper and lower anvils grip and hold the gage perpendicular to the stock surface. Well-balanced, the gage includes a retraction lever built into the handle and may be furnished with a direct of continuous reading dial, depending upon the use of the gage.



### Machine Produces Castings up to 1-Lb. Capacity

A. B. C. Die Casting Machine Co., 339 W. 112th Place, Chicago 28, Ill., has announced an air-operated zinc die casting



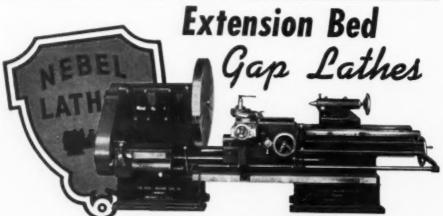
A. B. C. Air-Operated Zinc Die Casting Machine

machine with completely automatic cycling and adjustable timing dwell on the opening and closing of the toggle and in-

jection of the molten metal. The machine is said to produce castings up to 1 lb. in capacity utilizing die blocks from 1½ inches thickness by 8 x 10 inches with an allowable increase in die thickness up to 3 inches for each half. The machine is equipped with a 200-lb. pot and is capable of a free cycling speed beyond 1,000 shots per hour. It is of rugged construction and includes a powerful toggle arrangement to ensure relatively flash free castings.

#### Self-Centering Chuck

Known as the "Ajust-Tru," a selfcentering chuck which is said to be adjustable to a 0.0005-inch tolerance has been announced by the Buck Tool Co., 2015 Schippers Lane, Kalamazoo 62, Mich. Precision ground on all working surfaces and production balanced, the chuck is said to compensate for spindle runout, can be changed from lathe to lathe, and can be adapted to dividing heads, screw machines, and grinders. The jaws of the chuck move in and out like a scroll chuck to grip the work, and precision adjustment is made by four opposed fine-threaded screws operating between the chuck body and its adapter. Duplicate operations can be performed



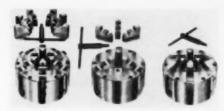
Hustrated is the Series
"AG 20/40" Extension
Bed Gap Lathe, Also made
in 28/50" Heavy Duty.

The Extension Bed Gap Lathe is designed to be used either as a gap lathe or an engine lathe.

We also manufacture a line of regular geared head engine lathes.

Write for circulars.

The Nebel Markeye Tool Co.



Buck "Ajust-Tru" Self-Centering Chucks

without further chuck adjustment.

The Ajust-Tru Chuck is available in 4.

5, and 6-inch diameters and in three models; namely, 3 and 6 step-jawed models with external and internal jaws, and a 6-jawed model for external grip only.

#### Coolant Pump

Designated as the "Gusher" Model 6 P3, a coolant pump



"Gusher" Model 6 P3 Coolant Pump

designed for use on various machine tools has been announced by The Ruthman Machinery Co., 1817 Reading Rd., Cincinnati 2, Ohio. The impeller housing spacer supports, mounting flange, and lower motor end bell of the pump are contained in one casting. One spacer support is cored to provide a discharge passage from the pump through the plate flange, thus eliminating piping within the reservoir and simplifying mounting in the tank.

The pump is driven by a 1/10-h.p. 3,450-r.p.m. motor equipped with precision permanently lubricated ball bearings. The shaft is one piece and extends through the entire length of the unit. The rotating assembly is balanced by an electronic process.

## Kester Solder

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#### Milling Machine Vise

A swivel base milling machine vise available in 3. 4½, and 6½-inch sizes has been announced by the L-W Chuck Co. 28 S. St. Clair St., Toledo 4, Ohio. Durably constructed of high-grade semisteel castings, the vise is equipped with hardened steel sliding jaws which have full-length bearing on a ground bar and machined ways. Four bolt and key slots are provided for attaching the vise rigidly to the machine table so that the workholding surfaces of the jaw body are either at right angles to or parallel to the table.

The 3-inch size has jaws 3 inches wide



L-W Swivel Base Milling Machine Vise

x 1 inch deep and has a 2-inch capacity. The  $4\frac{1}{2}$ -inch size has jaws  $4\frac{1}{2}$  inches wide x  $1\frac{3}{4}$  inches

wide x 1¾ inches deep, with a capacity of 3½ inches. The 6½-inch vise has a capacity of 5¼ inches and a jaw size of 6½ inches wide x 2 inches deep.



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#### Air Motor Arbor Stand

An arbor stand designed for con-



Bellows Arbor Stand equipped with air

verting a standard Bellows air motor into a lightduty air press for riveting, stamping, staking, pressing, marking, assembling, or other light production operations has been introduced by The Bellows Co., Dept. MMS 650, Akron, Ohio. The stand consists of an upright arbor and a base. Any one of the four Bellows air motors (Models BM-1, BM-2, BM-5, or BSSM-5) can be nose mounted on the arbor easily and quickly. The upright arbor is constructed of a rigid box-type casting. Two holes are provided in the top flat surface of the arbor, one for nose mounting the air motor and the other for a piston rod guide when a guided ram movement is required.

The bottom of the upright is machined flat and drilled for mounting on the base

plate. The base plate is constructed from 1½-inch thick steel plate and is ground flat on both sides to provide a smooth surface for mounting fixtures.

#### Heat Treating Furnace

Monogram Products Co., Inc., 731



Monogram Heat Treating Furnace

N. 35th St., Philadelphia 4, Pa., has announced the development of a heat treating furnace with "Lite-Cast" refractories in the heating chamber to ensure quick heat-up for efficiency and long life. The furnace has a chamber size of 7 x 7 x 12 inches and provides a maximum temperature of 2,000 deg. F. Three heat-up speeds are provided; namely, slow, medium, and fast.

Designed for operation on 110 or 220-volt 60-cycle current, the furnace can be obtained with the following controls: Indicating type of thermocouple thermometer; electronic type; pyrometric type; gold fuse over heating control. Special sizes and types of furnaces with chamber up to 12 x 12 x 24 inches can be made to specifications.



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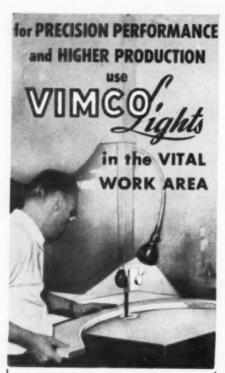
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WRITE FOR BULLETIN No. 74

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### New Shop Literature

Die Sets and Accessories. The Producto Machine Co., 910 Housatonic Ave., Bridgeport 1, Conn., is now offering a 72-page catalog covering standard die sets (master and commercial), special sets (in semi-steel and all-steel), diemakers' accessories, and toolroom and machine shop equipment. A new format provides color tabs for each section for easy identification, and a built-in pocket includes discount sheets and special bulletins. Illustrations, diagrams, and easy-to-read tables simplify rapid selection of die set style, size, and price.

Automatic Rotary Surface Grinders. An eight-page two-color bulletin (No. 245-2RM) released by the Mattison Machine Works, Rockford, Ill., describes and illustrates four "Hanchett Type" automatic rotary surface grinders for high production grinding operations. Specifications and other informative data are included.

Double-Enveloping Gear Speed Reducers. Cone-Drive Gears, Division of Michigan Tool Co., 7171 McNichols Rd., Detroit, Mich., has condensed its entire catalog of standard double-enveloping gear speed reducers, covering some 190,000 combinations of sizes, ratios, and types, into an eight-page bulletin (No. 8901-50). The bulletin contains complete information on ratings of all sizes and types, dimensional diagrams, and specifications of gear speed reducers.

Metal-Working Tools and Machinery. Whitney Metal Tool Co., 110 Forbes St., Rockford, Ill., has available a 52-page wire bound catalog (No. 16-50) containing illustrated, descriptive, and tabular information on a line of metal-working tools and machinery, including punches, shears, foot presses, foot shears, bending brakes, power presses, power shears, dies, and small tools.

Live Centers. Bulletin No. 105 presenting facts on Falls Roto Centers for lathes, grinders, milling machines, and other machine tools is now available from Falls Products. Inc., 124 Genoa St., Genoa, Illinois.

Power Presses. An eight-page twocolor bulletin (No. P650) released by Sales Service Machine Tool Co., 2363 University Ave., St. Paul 4, Minn., contains complete technical data, as well as general information, on the company's entire line of "Press-Rite" power presses, including bench, floor, flywheel, and back geared models.

Engine Lathe. The Springfield Machine Tool Co., Springfield, Ohio, has issued an eight-page catalog (No. 183) which contains detailed illustrations and an explanation of the most important parts and features a new engine lathe with 18½-inch swing over the bed and 10½-inch swing over the cross slide. Large full-view illustrations of both the front and rear of the lathe, as well as complete specifications, are also provided.

Hydraulic Power Units. Identified as Catalog No. 200. Section 1, a four-page catalog released by Logansport Machine Co., Inc., 801 Center Ave., Logansport, Ind., describes and illustrates recent engineering developments on hydraulic power units for various applications. Hydraulic Oils. The importance of using the correct hydraulic oil to obtain high production speeds, precise control, and long production runs is stressed in an eight-page booklet prepared by the Sun Oil Co.. Philadelphia 3, Pa., which features a chart showing the useful life characteristics of Sun hydraulic oils in relation to time and temperature.

Flame Hardening Apparatus. A 20page catalog containing descriptions and illustrations of flame hardening equipment has been released by Air Reduction, 60 E. 42nd St., New York 17, N. Y. Included is a section on "Tips for the Production Flame Hardening of Special Shapes."

Micro Grinder. A four-page two-color folder released by Sanford Mfg. Co., 1020-95 Commerce Ave., Union, N. J., illustrates and describes the Sanford Model MG Micro Grinder with 8 x 12 x 12-inch capacity. The folder shows the grinder set up for both wet and dry grinding, as well as its application in grinding as well as its application in grinding extra large parts.

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Anti Friction Bearing Centers are fully illustrated and described in two bulletins published by Ready Tool Co., 540 Iranistan Ave., Bridgeport 5, Conn. The bulletins include engineering data and prices on ball bearing centers for carbide cutting and grinding operations, as well as a diversified line of all-purpose centers.

Jig Grinder, designed to correct location and finish grind regular and irregular contours, as well as straight and tapered holes, is described in a four-page illustrated catalog published by Moore Special Tool Co., Inc., 730 Union Ave., Bridgeport 7, Conn. Examples of typical grinding jobs are included, as well as complete specifications of the new model.

Process for Bonding Rubber to Metal. A recent issue of "Rubber Developments," the quarterly prepared by The British Rubber Development Board and issued by the Natural Rubber Bureau. Dept. 1. 1631 K St., N. W., Washington, D. C., describes a new method of bonding rubber to metal, called the Redux Process, which, it is claimed, requires no extensive plant facilities and provides a means whereby almost every engineering firm can satisfactorily bond already vulcanized rubber to a metal surface.

Hydraulic Valves. Ninety different models of hydraulic valves are illustrated and described in a 52-page two-color catalog section (No. 202) published by Rivett Lathe & Grinder, Inc., Dept. MMSA-10, Brighton 35, Boston, Mass. Hand, foot, cam, solenoid, oil pressure and air pressure operated valves suitable for pressures up to 1,500 p.s.i. are covered.

Tool Grinding and Lapping Machines for hard metal, high speed steel, and other types of tools are described and illustrated in a four-page folder available from Hauser Machine Tool Corp., 30 Park Ave., Manhasset, New York. Hydraulic Cylinders. Catalog No. 233A, published by Hanna Engineering Works, 1765 Elston Ave., Chicago 22, Ill., contains 28 pages of illustrations, specifications, design, construction and operation features, and suggestions for uses of high pressures up to 1500 pounds per square inch.



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trols let you open and close bottom half, or both sections, at will.

Cutoff Wheels. Moisture proofed abrasive cutting wheels are described in a six-page folder published by Chicago Wheel & Mfg. Co., 1101 W. Monroe St., Dept. MMS, Chicago 7, Ill., which also illustrates advantages and features of this new development in abrasives to assure maximum cutting efficiency.

Engine and Toolmaker's Lathes available in 12. 14. 16. and 20-inch sizes are concisely described and fully illustrated in a 44-page catalog (No. 1113) issued by The Monarch Machine Tool Co., Sidney, Ohio. Also described and illustrated are

lathe accessories and attachments. including an automatic work driver. lever-operated collet attachment, and ball turning rest. A pictorial summary of quality control techniques used in Monarch lathe manufacture completes the presentation.

Portable Tools, A 72-page catalog issued by Skilsaw. Inc., 5033 Elston Ave., Chicago 30. Ill., contains complete data on specifications, features. applications, and uses of ''Skil'' saws, drills, sanders, and other types of portable power tools for the manufacturing, construction, and automotive service industries.

Precision Cylindrical Grinders. Landis Tool Co., Waynesboro, Pa .. has issued a 22page catalog (B-50) which illustrates and describes 10 and 14-inch plain hydraulic cylindrical grinding machines adaptable for semi-automatic operation and angular wheel base grindings.

Flexible Shaft Machines. Catalog 31 now available from The Balmar Corp., N. tachments.

A. Strand Div., 5001 N. Wolcott, Chicago 40, Ill., contains illustrated, descriptive, and tabular information on various types of flexible shaft machines for a wide variety of operations, including grinding, buffing, polishing, sanding, drilling, reaming, rotary filing, wire brushing, nut setting, rasping, and so on. Also described and illustrated are flexible shaft cores and casings, spindles, handpieces, angular attachments, chucks, sanding drums, couplings, and various other flexible shaft tools and at-

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Automatic Lathe. An eight-page twocolor circular released by Sundstrand Machine Tool Co., 2539 11th St., Rockford, Ill., illustrates and describes the Sundstrand Model SA Automatic Lathe for both short and long run turning.

Quili Travel Vertical Mill Attachment for use on bench, light floor, and heavy mills in performing milling, drilling and boring operations is fully illustrated and described in a four-page, two-color folder issued by Rusnok Tool Works, 4840 W. North Ave., Chicago 39, Illinois.



Automatic Presses. A six-page twocolor folder issued by the Di Machine Corp., 2714 Irving Park Rd., Chicago 18, Ill., illustrates and describes a line of automatic presses available in 5, 8, and 12ton models with built-in precision single or double feeds for use in the production of a wide variety of stampings.

High Temperature Oils. The results of an extensive 18-month research program on high temperature lubrication form the basis of a four-page folder on Hi-Temp Oils issued by E. F. Houghton & Co., 303 W. Lehigh Ave., Philadelphia 43. Pa. The well-illustrated folder completely describes the testing procedure used by Houghton's research staff in setting up three series of oils to meet all high temperature conditions up to and even over 500 deg. Fahrenheit.

Air Motor. A specification sheet now available from The Bellows Co., Akron. Ohio, covers the Bellows "Super Speed" Air Motor which is essentially a double-acting air cylinder that is said to be ideally suited to a wide range of staking, riveting, forming, swedging, stamping, and punching operations.





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21 to 30		53/8	.80	29/64	12	9	3.60
31 to 40	)	51/4	.70	15/32	12	9	3.60
41 to 50	)	41/2	.60	31/64	12	9	3.60
51 to 60		41/4	.50	1/2	12	9	3.60
	Straight	Shank			Taper :	Shank	
Size Inches	Length Overall Inches	Length Flute Inches	Price Each Net	17/32 9/16	15 15	12 12	\$7.00 7.70
1/8	12	9	\$1.65	19/32	15	12	8.25
9/64	12	9	1.65	5/8	15	12	8.80
5/32	12	9	1.65	21/32	15	12	9.00
11/64	12	9	1.65	11/16	15	12	9.10
3/16	12	9	1.65	23/32	15	12	9.35
13/64	12	9	1.76	3/4	15	12	9.50
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Surface Grinders. Released by the Mattison Machine Works, Rockford, Ill., is a 12-page two-color bulletin (No. 345-3RM) which describes and illustrates the Plano Type surface grinder designed for grinding workpieces having large, flat surfaces. Full details and specifications are contained in the bulletin.

Speed Control Valves. A four-page twocolor bulletin (No. 253) illustrating and describing a line of valves suitable for the control of air, water, or oil with maximum pressure up to 250 p.s.i. and maximum temperature of 250 deg. F. is now available from Hanna Eng. Works, 1765 Elston Ave., Chicago 22, Illinois.

Light Duty Drill Presses, including 1, 2, 3, and 4-spindle units in bench and floor types, are described and illustrated in a four-page folder released by Boice-Crane Co., 937 Central Ave., Toledo 6, Ohio. Assembly parts for special setups, tapping machines and a complete line of accessories are also covered.

Engraving Machine and Work-Holding Fixtures. A four-page two-color illustrated catalog released by the Green Instrument Co., Inc., 378 Putnam Ave., Cambridge, Mass., presents a three-dimensional pantograph engraving and modeling machine (Model 106) which is said to quickly cut up to four lines of letters from & to 1 inch on curved or flat surfaces of metal, wood, or plastics. Work-holding fixtures designed for use with the machine are fully described.



Hones and Honing Equipment. Superlor Hone Corp., 1607 Eireno St., Elkhart, Ind., has available literature covering its line of hones and honing equipment.

Products and Services Index. A 16-page index to National Acme products and services has been published by The National Acme Co.. 170 E. 131st St., Cleveland 8, Ohio. Identified as the No. NA-1, the builetin, from pages 2 to 10, covers products of the machinery division, including single and double spindle bar machines, automatic chucking machines, thread and form rolling machines, threading machines, and centrifuges. The remaining pages of the builetin cover tools for threading and hollow milling, collapsible taps, tool grinding equipment, solenoids, Chronologs, switches, counters, and the contract manufacturing facilities of the company.

Fluid Pressure Boosters. The Miller Motor Co., 4027 N. Kedzie Ave., Chicago 18. Ill., has issued a 12-page well illustrated bulletin (B-200) explaining how the company's line of fluid pressure boosters can be employed to conserve space and weight, reduce costs, and increase efficiency in clamping, punching, shearing, stamping, crimping, welding, pressing, and similar applications accomplished by compressed air or hydraulic power. Circuit diagrams, simplified formulas for calculating boosters, illustrations and descriptions of actual models available, together with mounting and dimensional data and a handy time-saving booster selector chart, are also provided.

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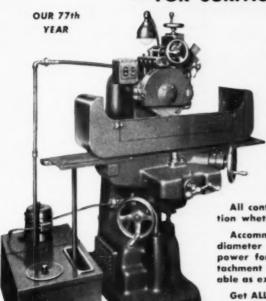
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#### Over The Editor's Desk

#### Guns and Political Butter

THE security and prosperity of this country in the immediate future depend to a great extent upon the decisions made by the key officials in the defense department; thus it is only natural that the attention of the nation should be focused upon their activities.

The hesitation and seeming bewilderment on the part of some of these officials in meeting the crucial issues before them has been viewed with an increasing amount of alarm by those who realize that the present situation calls for utmost urgency, and requires much more than half-hearted effort in the direction of industrial mobilization.

It is becoming more and more apparent that the reluctance of some of our governmental leaders to deviate from "politics as usual" is hampering the efforts of the industrial leaders who have been called to Washington to help direct the mobilization program.

For the most part, there is little doubt that America's production resources, when fully mobilized, can out-produce all the other nations of the Earth combined. We found, during the last war, that we were able to meet the requirements of a thirteen millionman army, furnish our allies with huge quantities of equipment and supplies, and at the same time maintain a relatively high standard of living for the civilian population.

Today our capacity to produce is even greater than it was during the most crucial years of World War II-but we must not overlook the fact that our consumer-population has increased also. Now we are fighting a war-a war that may turn out to be the most critical of this nation's entire history-while, at the same time, trying to maintain the high standard of living to which we have become accustomed. The cold facts are that, if we are to be certain of survival, we cannot have both guns and butter.

It is apparent that a vote-minded administration is reluctant to lay these cold facts before the people, and in this reluctance they are both jeopardizing the security of the country and are being unfair and unjust to these industrial leaders whom they have called in to assist them, for if the effort to supply the war needs fails, the government will shift the blame to the shoulders of the industrialists.

Is it the Administration's plan, in the event of a breakdown of the industrial mobilization program, to use this failure as grounds for complete governmental domination of the American economy? This is no time for political maneuvering; let's be satisfied with less butter now, and make sure of our survival as a free nation.

fred W Vogel

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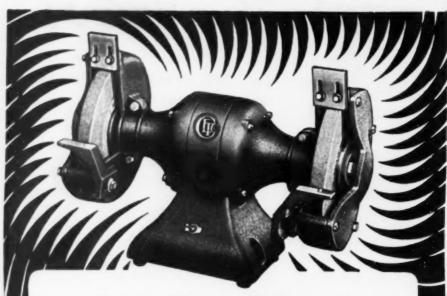
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#### Typical application of the

BAKER 17HO DRILL

is shown at left with 30"dia. hand index 2 station table and "Shot Pin" to assure accurate location at each station. Machine features two spindle head and four work holding fixtures to load two parts.

#### Operation

Total time for 2 parts

Est. 30 seconds
Production rate 100%

Est. 240 parts per hour

BAKER BROS., Inc., Toledo, Ohio

DRILLING, TAPPING, KEYSEATING & CONTOUR GRINDING MACHINES

NG PERFORMANCE GUARANTEED

### **HOLO-KROME** Completely Cold Forged Socket SET SCREWS

#### POSITIVE HOLDING POWER

H-K internal wrenching principle and accurate Class 3 Thread Fit give firm, unfailing grip. Five points - Cone, Flat, Oval, Half Dog, Cup-fit every application requirement.

#### SAFE . . . EASY TO INSTALL

No dangerous, protruding heads. Helps streamline designs. Easily applied in hard-toreach locations.

#### GREATER STRENGTH

Completely cold forged from special analysis alloy steel and scientifically heat treated for rugged dependability.



Available through Authorized Holo-Krome Distributors

### **HOLO-KROME**



Completely Cold Forged Socket Screw Products

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